EDITH COWAN UNIVERSITY

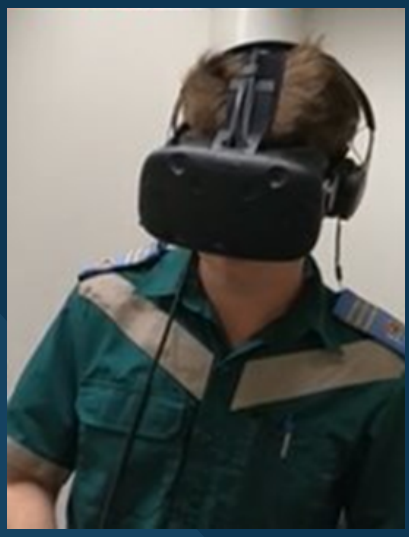
SIMULATION & IMMERSIVE DIGITAL TECHNOLOGY GROUP

SCOPE AND OPPORTUNITIES

CONTACT:
Dr BRENNEN MILLS, Group Lead
b.mills@ecu.edu.au
+61 8 6304 3947

IMMERSIVE

DIGITAL TECH

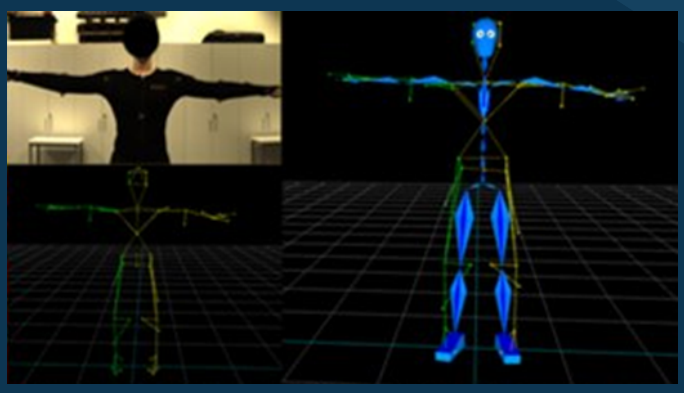


BACKGROUND

Modern virtual reality (VR) technology enables highly immersive simulated experiences which engage users with authentic virtual worlds. Specialist software is used to integrate digital surround sound and visual effects to produce VR environments through which users can explore, discover and learn. Since first appearing in the 1960's, VR technologies have evolved to enable near real world human experiences. The advent of tools such as the 'Oculus Rift' and 'HTC Vive' have provided a step change in making VR technology highly user-friendly and economically accessible. VR is hugely popular and well-established in the entertainment industries.

VR separates itself from augmented reality (AR); where VR is a computer-generated re-creation of a real-world environment, AR layers computer-generated enhancements atop an existing reality. AR is commonly associated with mobile devices that blend digital components into the real world such that they enhance one another.

Both VR and AR are considered novel in the education and training setting, with technology only very recently becoming available that makes education and training in this sector viable. In the education and training setting, AR has been shown to be effective in the training of some haptic skills, whereas VR has been shown to be more effectively utilised for the training of 'soft' skills such as communication, coordination, teamwork and empathy.



The education and training sector is now quickly adopting VR technology through the utilisation of engaging, collaborative and cost-effective learning experiences. The value of utilising VR technology for education and training is that experiences can be delivered at a time that works for individuals and teams without the need for large amounts of coordinated resources and staffing. Feedback can be built into bespoke applications allowing users to receive feedback on their decision-making. This allows users to work to improve through repeated use, with data being securely stored within each user's profile and updated after each experience, allowing improvement to be monitored over time. Also, standardisation of training through VR applications ensures all users can experience standardised training, as opposed to many forms of in situ simulation-based training which can vary between scenarios, across trainers and across sites. Further, with simple adjustments to software, different policy and protocol considerations can be made to ensure training aligns with guidelines and/or protocols from different jurisdictional systems.

When applied in education and training, VR can improve workers' skill and responses for both routine and emergency tasks by recreating task environments, settings, situations and circumstances otherwise difficult to replicate in real-world conditions. Through exposing personnel to rare and highly chaotic situations, from a fully immersive first or third-person perspective, in entirely safe environments, VR experiences can expose and prepare individuals and teams for incidents impossible or too expensive to recreate in a classroom or mock training facility.

SIMULATION & IMMERSIVE DIGITAL TECHNOLOGY GROUP

SPANNING SIX ECU SCHOOLS

- SCHOOL OF MEDICAL & HEALTH SCIENCES
- WA ACADEMY OF PERFORMING ARTS
- SCHOOL OF SCIENCE
- SCHOOL OF EDUCATION
- SCHOOL OF ARTS& HUMANITIES
- SCHOOL OF NURSING & MIDWIFERY

The Simulation & Immersive Digital Technology Group (SIDTG), operating out of Edith Cowan University in Western Australia, is comprised of a multidisciplinary research and development team who investigate the use of digital and immersive technologies, such as serious games and virtual reality, for real world simulation and educational needs. Spanning six ECU schools, this unique collaborative team bring together skills which cover health and exercise sciences research, simulation education, serious game theory, game design, animation and biomechanics.

Through use of an ECU in-house industry standard 21 camera motion capture studio, high fidelity, human focussed virtual simulations can be produced and evaluated which are difficult to replicate in real-world conditions. This gold standard infrastructure facilitates both high fidelity digital human animation as well as high accuracy biomechanical human movement analyses. Based at the ECU Mt Lawley campus, the ECU Motion Capture Studio is directly connected with the talented Western Australian Academy of Performing Arts (WAAPA) acting department.

Leading immersive simulation brings the unique needs of each client into customised virtual training environments. The expertise and infrastructure housed in the ECU Motion Capture Studio enables fast production of digital simulation and training that are adapted to individual client needs.

Generic off the shelf simulations can be replaced by authentic virtual simulations made explicitly to recreate client working environments. Customised simulations train the specific staff skills required for their bespoke workplace health and safety needs.

Formative and evaluative research contribute to the evidence base informing best practices for applied immersive simulation and education. Real world engagement and impact is recognised through consultation with industry partners and end-users, and the implementation of immersive simulation experiences which are developed for bespoke industry needs.

The SIDTG collaborates with a series of co-design partners across Government, Non-Government (NGO) and private organisations. Our research and development pathway has been refined to ensure developed applications meet end-user requirements, incorporating a research agenda alongside game/software development to a scientific, publishable level.

SIDTG CAPABILITY OVERVIEW

PROJECT TYPES

- Screen-based education applications
  - Video-based
  - Computer generated
  - Serious Games
- Immersive virtual reality applications
- Augmented reality applications
- Mixed/extended reality applications

RESEARCH & DEVELOPMENT PIPELINE

Formative research

- Project scope
- Nature of the problem
- End-user requirements
- Platforms

Design & Storyboarding

- Project specifications
- Learning objectives
- Narrative
- Mechanics

Application build

- In-house software development capability
- Unity game engine
- Motion capture studio
- WAAPA actors

Evaluation

- Contribution towards learning
- Mixed-methods
- HDR students

A brief synopsis of key SIDTG projects (non-exhaustive) are outlined hereafter. Links to project video resources are provided on the last page.

SIDEFFECT GAMEPLAN

DESKTOP COMPUTER BASED EDUCATION PACKAGE

PARTNERS:

- Sideffect Australia (NGO; https://sideffect.org.au/)
- University of Sunshine Coast
- Australian Council for Health, Physical Education and Recreation

PROJECT SYNOPSIS

Sideffect GamePlan is an alcohol and other drug (AOD) education package that connects tailored learning activities and discussions with a gamified branching interactive narrative. The package is freely available for use in classrooms nationwide, providing schools with an easy-to-use, engaging resource for AOD education delivery, demonstrated to align with the Year 9 and 10 Health and Physical Education Australian curriculum.

The game component presents a multi-layered story explored through the choices of three characters, each revealing a different perspective following an incident at a house party. Accompanying learning modules engage students in meaningful conversations about AOD use, risk-taking behaviour, decision-making and harm reduction strategies. Features of this interconnected game/module include:

- Flexible delivery for educators, with up to six structured lessons available via a custom-built LMS;
- Teacher resources, instructions and worksheets aligned to in-game content, easily deliverable regardless of technology or content familiarity;
- A 'lesson mode' that simplifies delivery and accommodates differing lesson lengths;
- Repeatable, standardised lesson formats for use in classrooms, at home, or through remote learning.

ACCOLADES

- Merit Award Winner (runner-up); Australian Information Industry Association National iAwards, 2022 (Not-for-Profit/Community Solution category)
- Finalist; Australian Information Industry Association National iAwards, 2022 (Government & Public Sector Solution category)
- Winner; 31st West Australian Information Technology and Telecommunication Alliance INCITE Awards Winner, 2022 (Research & Innovation [Industry] Project of the Year category)
- Merit Award Winner (runner-up); 31st West Australian Information Technology and Telecommunication Alliance INCITE Awards, 2022 (Social Impact category)

PUBLICATIONS

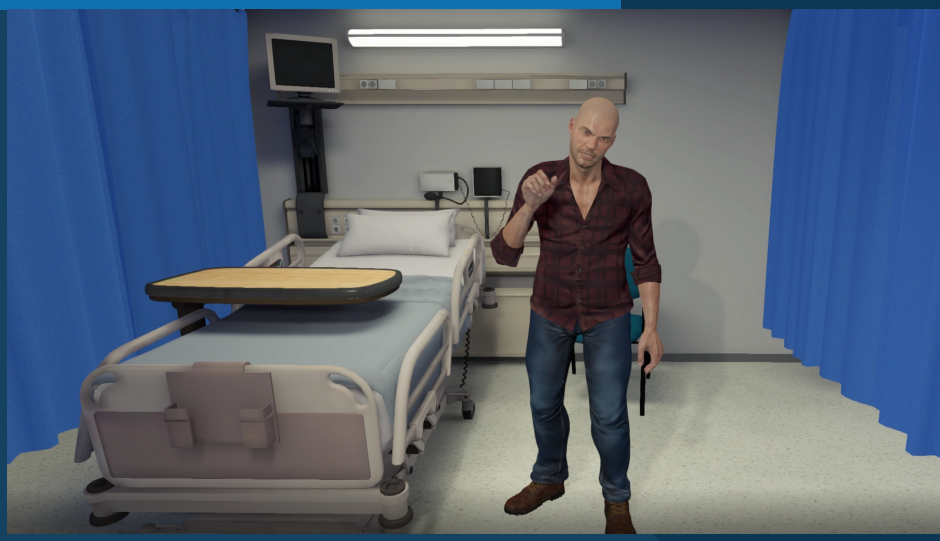
- Nicholas J., Mills B., Hansen S., Bright S., Boyd H., Brook L., Watson J. & Hopper L. (2022) Developing an alcohol and other drug serious game for adolescents: Considerations for improving student engagement. Australian & New Zealand Journal of Public Health. Doi: 10.1111/1753-6405.13287

DE-ESCALATION & MANAGEMENT OF AGGRESSIVE & VIOLENT PATIENTS

VIRTUAL REALITY EDUCATION PACKAGE

Partners:

- North, South and East Metropolitan WA Health Services
- Rockingham General Hospital
- Fiona Stanley Hospital
- Sir Charles Gairdner Hospital
- Royal Perth Hospital



PROJECT SYNOPSIS

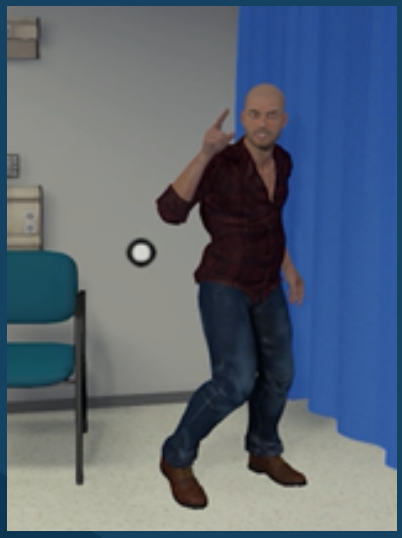
Violence and aggression towards front line healthcare workers represents a rapidly increasing strain on Australian hospitals. Provision of face-to-face education and training for hospital staff in early identification of aggressive patients, appropriate response plans, and avoidance or de-escalation is problematic due to limited resources, staff time, and lack of consistency. This immersive virtual reality (VR) application provides a novel method of training for early aggression identification and de-escalation techniques for Emergency Department (ED) front line healthcare.

The value of utilising VR technology in this space is that training can be delivered at a time that works for individual clinicians without the need for large amounts of coordinated resources and staffing. Feedback is built into the application allowing users to gauge their decision-making and work to improve through repeated use, with this data being securely stored within each users profile and updated after each experience allowing improvement to be monitored over time. Also, standardisation of training through VR applications ensures all users can experience the same training, as opposed to many forms of in situ simulation-based training which can vary scenario to scenario. Further, with simple adjustments to the software, different policy and protocol considerations can be made to ensure training aligns with guidelines from different hospital systems.

Ensuring staff feel safe and confident at work is imperative to successfully manage potentially violent situations, alleviate associated workload stressors, and limit resource drain on healthcare (and other) systems.

PRESENTATIONS

- West Australian Simulation in Healthcare Alliance Annual General Meeting (10 November 2022)
- Perth Children's Hospital Simulation Interest Group (25 August 2022)
- Australian and New Zealand Association for Health Professional Educators Festival (13 July 2022)
- University of Western Australia Education Research Symposium (10 May 2022)



PUBLICATIONS

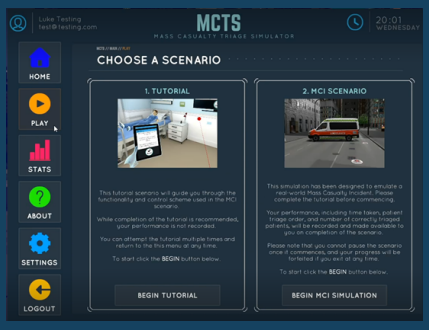
- Johnson J., Hansen S., Hopper, L. Brook, L., Watson, J. & Mills, B. (2022) (Under review) A qualitative study exploring perspectives of frontline healthcare professionals. International Emergency Nursing.

ENHANCING PREPAREDNESS TO MASS CASUALTY INCIDENT REPSPONSE FOR EMERGENCY RESPONDERS

VIRTUAL REALITY EDUCATION PACKAGE

Partners:

- St John Ambulance WA
- Queensland Ambulance Service



PROJECT SYNOPSIS

Mass/multi casualty (MC) events are catastrophic. The involvement of multiple casualties can readily overwhelm the resources available to a single health professional and health professional teams. Such events occur from man-made or natural disasters and cause devastating injuries to large numbers of people and disastrous losses to entire communities. It is imperative paramedics are effectively trained to respond. Current MC training practices have been described as 'clunky', costly, highly-resource intensive and providing limited learning value, so much so that training is rarely provided for emergency response personnel, leading to documented response issues from actual disasters. Mass casualty response training delivered through virtual reality technology provides an easily accessible, standardised, authentic format for mass casualty response education, and has been demonstrated to be similar with respect to learning contribution to large-scale mass casualty simulations (previously considered the gold standard training format requiring an enormous amount of resources to deliver).

ACCOLADES

- Winner; ACS Digital Disruptor Awards Finalists, 2019 (Skills Transformation of Work Teams (Large))
- Winner; 28th West Australian Information Technology and Telecommunication Alliance INCITE Awards, (Most Transformative Impact on Education)
- Winner; Vice Chancellor's Inspiring Staff Award, Teams.
- Finalist; Serious Games Showcase and Challenge Australasia
- Finalist; Australian Information Industry Association National iAwards (Community & Consumer Markets)
- Finalist; 28th West Australian Information Technology and Telecommunication Alliance INCITE Awards (Most Innovative Enabler in Health Care)

PUBLICATIONS

- Mills, B., Dykstra, P., Hansen, S., Miles, A., Rankin, T., Hopper, L., Brook, L. & Bartlett, D. (2020) Virtual reality triage training can provide comparable simulation efficacy for paramedicine students compared to live simulation-based scenarios. Prehospital Emergency Care. 24:4, 525–536.

TACTICAL PARACHUTE TRAINING FOR DEFENCE PERSONNEL

VIRTUAL REALITY EDUCATION PACKAGE

Partners:

- Australian Special Operations Command (SOCOMD, Department of Defence)
- Curtin University
- Murdoch University

PROJECT SYNOPSIS

Safe and effective advanced tactical parachute navigation and manoeuvring under high-risk conditions necessitates repetition-of-practice. While knowledge acquisition can occur via traditional training techniques involving training manuals, lectures and procedures practice, experiential learning is limited to actual jumps. Compressed timeframes to complete manoeuvres, as well as imposed jump limits and meteorological conditions severely reduce opportunities to practice. Each of these individual descents may be interrupted by several hours of fitting and checking equipment, emplaning, climbing to altitude, circling for each individual or team to jump and returning to the administration area or drop zone. This project has capacity to revolutionise military parachutist mission planning and training across Defence, starting with a local use case amongst advanced tactical training in Special Operations Command (SOCOMD), through the novel research and development of an immersive virtual reality (IVR) enhanced tactical parachute application to enhance mission planning capability and training of tactics, techniques and procedures otherwise impossible to replicate in real-world environments.

Each user is able to specify a mission configuration as the location of the landing target, anywhere on the earth, altitude and bearing of the parachute at canopy opening, as well as wind speed and heading at 1000ft altitude intervals between the parachute opening position and the landing target. The system recreates a first-person view, visualised and displayed to the user through a virtual reality headset, and allows the user to control a virtual parachute from parachute opening to the point just before the user virtually lands. After the VR experience, the system allows users to review their parachute descent.

PRESENTATIONS

- Indian Ocean Defence & Security Conference (August 25-26, 2022)

FORENSIC CRIME SCENE PHOTOGRAPHY TRAINING

VIRTUAL REALITY PACKAGE

PROJECT SYNOPSIS

Forensic photography is a critical undertaking in crime scene investigation, providing an accurate record of the initial appearance of a scene and capturing physical evidence in situ, helping the investigative team and juries piece together true versions of events. While forensic photography is a vital element of the criminal justice system, forensic photography is a highly advanced skill requiring integration of key photography principles and detailed sequencing of images to properly capture and preserve information.

Undergraduate students studying SCH2143 Forensic Skills currently practice their photography techniques in simulated crime scenes. These live simulations provide the students with a realistic representation of a crime scene. However, this exposure is the first time the students are able to practically apply the theoretical concepts of crime scene photography. With these limitations in mind, we have developed a virtual reality (VR) pre-training environment to allow for improved skill development and enhanced student learning in the essential skill of forensic photography. The digital sound and visual effects used in the VR environment creates an authentic experience which replicates the real-world setting, while providing a risk-free environment in which students can practice their skills.

PRESENTATIONS

- Australian and New Zealand Forensic Science Society (2022 - International)
- Australian and New Zealand Forensic Science Society (WA Branch) (2021)
- WA Learning and Teaching Forum (2020)
- WA Learning and Teaching Forum (2019)
- Australasian Society for Human Biology (ASHB) (2018)

AUGMENTED REALITY CHILD HEALTH INTERACTIVE EXPERIENCE (ARCHIE)

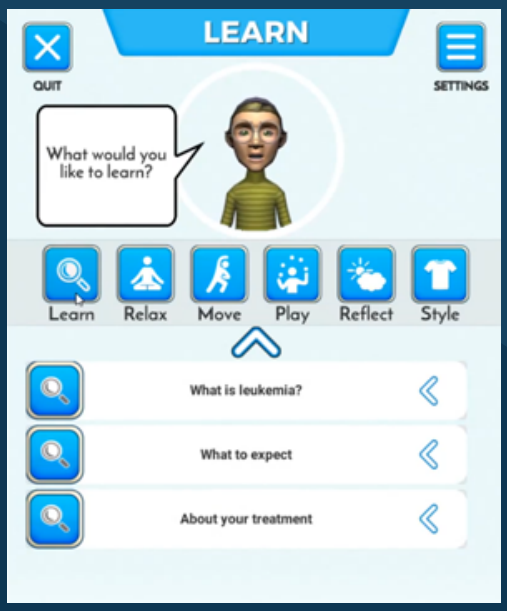
AUGMENTED REALITY PACKAGE

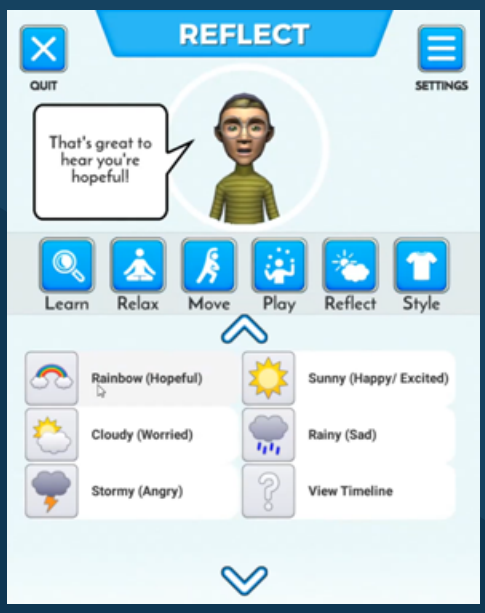
Partners:

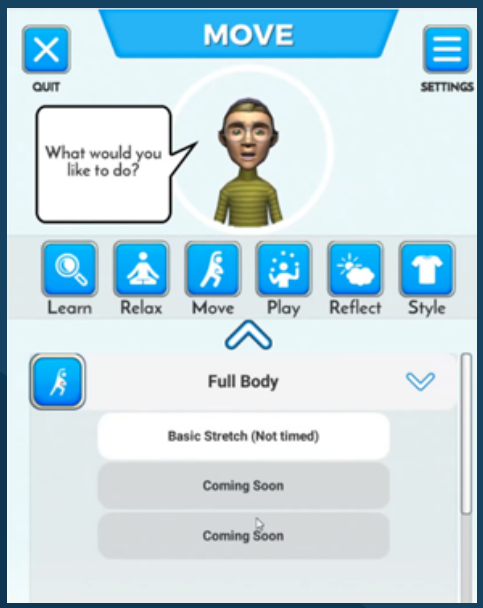
- Perth Children's Hospital
- Telethon Kids Institute
- Redkite Australia (kids charity & family support) https://www.redkite.org.au/)

PROJECT SYNOPSIS

Receiving a cancer diagnosis is devastating. For children particularly, a cancer diagnosis can be substantially more difficult as it occurs at time in the lifecycle where coping and resilience features are underdeveloped. A new diagnosis of cancer can substantially drain and exhaust personal, psychological and social support resources for children and their families. Hospital admission itself removes children from their natural environment, separating them from family members, friends and schools. Unsurprisingly, childhood cancer patients and their families experience psychological distress including symptoms of anxiety and depression at rates far exceeding their healthy peers. Presentation of anxiety and depression as early as one-month post diagnosis can significantly increase the risk of symptom persistence throughout the first year of therapy. This highlights an important window of opportunity to not only identify early signs of anxiety and depression, but also provide psychological interventions and preventative strategies to reduce risk of mental health complications in this highly vulnerable group. In order to help children through their cancer diagnosis and treatment, we seek to design, build and trial an innovative and comprehensive therapeutic program for paediatric cancer patients. We will combine our knowledge of psychological therapeutic experiences for cancer treatments with digital gaming evidence, utilising augmented reality technology, to build ARCHIE (Augmented Reality Child Health Interactive Experience).







BIOGRAPHIES OF SIDTG MEMBERS

SCHOOL OF MEDICAL AND HEALTH SCIENCES

Dr Brennen Mills, PhD

Dr Mills is a Senior Lecturer and active researcher in Paramedical Science and Public Health in the SMHS at ECU. Dr Mills' background is in the development and evaluation of innovative technologies and high-fidelity simulation-based learning environments for education and training, with a focus on resilience building amongst healthcare professionals. This includes development and evaluation of novel pathways for augmented and virtual reality technology, and the potential impact on patient experiences and education and training. Dr Mills has extensive experience leading research and development user-centred design projects working alongside industry partners, including (but not limited to) the Department of Defence, Department of Education, WA Police, Department of Fire and Emergency Services, and WA Department of Health. Dr Mills also serves as the Chair of the ECU SMHS Ethics Subcommittee, and the ECU Early-Mid Career Research Network. He is also an executive committee member of the WA Country Health Service Human Research Ethics Committee and the WA Simulation in Healthcare Alliance.

Ms Sara Hansen, RN, MSN

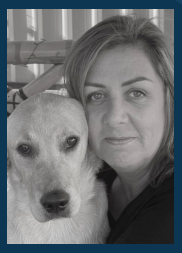
Ms Hansen is the Simulation Education Coordinator within the SMHS at ECU. With a background in nursing, Ms Hansen develops and coordinates delivery of high-fidelity commercial simulation programs for courses in SMHS and a variety of industry partners including the Department of Health WA, the Australian Resuscitation Council, and the Australian Healthcare Practitioner Regulation Agency (AHPRA). Her focus centres on the development and application of immersive technologies to enhance quality and safety in healthcare and other high-risk industries.

Mr Wyatt de Souza, B. comm

Mr de Souza is a research assistant and virtual reality software developer. Mr de Souza has worked in both commercial and academic sectors developing virtual and augmented reality tools and simulations. He has worked on projects for clients such as the Department of Parks and Wildlife, Rio Tinto and Austin Engineering

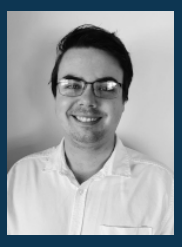
Ms Alecka Miles

Ms Miles is a Lecturer within the SMHS and post-graduate course coordinator for the Master of Paramedic Practitioner course. Alecka is a Paramedic who has 15 years experience in Paramedicine including an extensive background in education for Student Paramedics (service and tertiary), Ambulance Volunteers, Career and Volunteer Firefighters and First Responders. Alecka is a passionate educator who has worked to improve the quality of pre-hospital care through many roles in the ambulance and emergency service industries as well as community education.



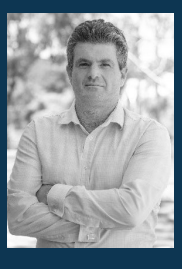
Dr Lisa Holmes, PhD

Dr Lisa Holmes has an extensive education and training background in tertiary and workplace environments. Her research focus areas are education, workplace training and the mental health and well-being of staff and students. She has published guidelines for embedding mental health and well-being across accredited undergraduate paramedicine courses, in addition to developing interactive activities for both students and staff well-being. Recently she has introduced wellness dogs to reduce the anxiety and stress of students and staff. She is also an active accredited Mental Health First Aid Trainer.



Mr Josh Johnson, B.S.c.

Mr Johnson is a Research Assistant within the School of Medical and Health Sciences at Edith Cowan University. Mr Johnson graduated from a Bachelor of Science (Paramedical Science) in 2019 and is currently a Master of Medical and Health Science by Research candidate. His research focuses on utilising immersive technology to enhance training and safety in healthcare. Mr Johnson is currently involved in the creation of a virtual reality training program designed to support aggression and violence de-escalation training for front line emergency department workers and students.



Dr Stephen Bright, PhD

Dr Bright has worked as a psychologist within the Mental Health & AOD field for the past 15 years. He is currently Senior Lecturer of Addiction at Edith Cowan University. Stephen is a strong advocate of harm reduction and an evidence-based approach to AOD legislation. Stephen is a leading Australian voice on the role of drug policy on emerging drug trends such as synthetic cannabis and darkweb marketplaces.

BIOGRAPHIES OF SIDTG MEMBERS

Dr Jemma Berry, PhD
Dr Berry Jemma is a Senior Lecturer in Genetics and Forensic Science within SMHS. As a STEM educator with a background in medical research, Jemma strives to provide authentic learning opportunities, enthusiastically embracing technology and innovation to help inspire and develop a passion for life-long learning. Jemma has been recognised for her work in this area, receiving a WiTWA award in 2021, and being nominated for an ECU Vice Chancellor's Citation for Outstanding Contributions to Student Learning in 2022.

WESTERN AUSTRALIAN ACADEMY OF PERFORMING ARTS

Dr Luke Hopper, PhD
Dr Hopper has extensive experience in managing international research and development projects in collaboration with community partners. Dr Hopper specialises in the analysis and visualisation of human movement using 3D motion capture. Dr Hopper has served on the board of the International Association of Dance Medicine and Science and the Australian Society for Performing Arts Healthcare. In his position at ECU, Dr Hopper is developing a health education and research program with the aim of preventing injury and illness in performing artists.

Dr Joanna Nicholas, PhD
Dr Nicholas is a Postdoctoral Research Fellow and Lecturer at WAAPA. She is an accredited exercise scientist, dance scientist, and health researcher, and has experience in qualitative and quantitative research methods in a range of settings including workplace health, community-based dance and sport, and youth well-being in rural and remote settings. Dr Nicholas has worked on projects that span performing arts, health behaviour, psychology, physiology, biomechanics (including 3D motion capture), and injury prevention. Dr Nicholas has experience in digital technology user-experience research.

Ms Jessica Watson, BSc (Psych), BCI
Ms Watson is a motion capture technician and arts and game design lecturer. She uses real-world performances of actors and dancers to develop engaging interactions in VR, AR and other digital environments. Ms Watson also has expertise is end-user design, storyboarding and narrative script-writing.

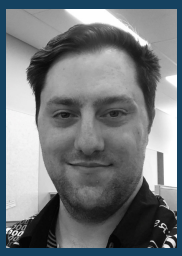
Michella Hill, M.S.c.
Ms Hill is a Research Associate within the Simulation and Immersive Digital and Immersive Technology team, and PhD candidate in the Paramedicine team at ECU. Her current research focuses on out-of-hospital births in paramedic care. She is designing a virtual reality training program for paramedics and students to increase their exposure and confidence with these low frequency-high risk situations and improve patient outcomes. Following her Bachelor of Science (Paramedicine) degree, she completed her Masters by Research project entitled "Dr Google", which reviewed online symptoms checkers accessible to the Australian public. She is a registered non-practicing paramedic planning to become an early-career researcher focusing on improving pre-hospital patient care.

Ms Imogen Ridout, BBehSc
Ms Ridout is a Research Assistant and Sessional Lecturer at the Western Australian Academy of Performing Arts (WAAPA). She has experience in both qualitative and quantitative research methods and is involved in data collection and manuscript preparation.

BIOGRAPHIES OF SIDTG MEMBERS

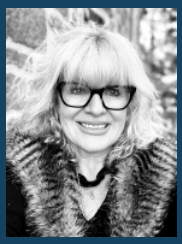
SCHOOL OF SCIENCE

A/Prof Martin Masek
Dr Masek is an Associate Professor of Computer Science in the School of Science at ECU. His research is on the application of artificial intelligence, image processing, and real-time interactive simulation techniques to solve problems in the domains of health, education and defence. Dr Masek also has an extensive background in the research and development of gaming technology for education and training purposes.



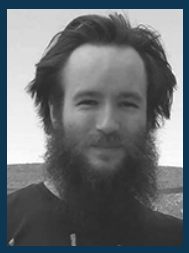
Mr Jake Snell, BCS
Mr Snell is a Research Assistant within the School of Science at ECU where he lends his expertise on 3D visualisation and AI to immersive digital technology projects. Jake has a Bachelor of Computer Science and Games Programming, and has worked as a software developer in the finance industry.

SCHOOL OF EDUCATION



Dr Julie Boston, PhD
Dr Boston is a Senior Lecturer and the Academic Coordinator of Industry Engagement and Partnerships for the School of Education at ECU, responsible for identifying, establishing and managing educational partnerships and enterprise related programs that drive strategic priorities for ECU. Dr Boston has an extensive background in education and pedagogy, leading research and development projects with a focus on the use of gaming and immersive technologies to support learning and teaching.

SCHOOL OF ARTS AND HUMANITIES



Mr Sean Cashman, BA (Creative Industries)
Mr Cashman is a certified associate with Unity Technologies for the development of applications through the Unity game engine. He is also a sessional lecturer within the ECU SAH teaching game design. Mr Cashman has extensive experience in software development for serious games applications for education and training purposes.

SCHOOL OF NURSING AND MIDWIFERY

Dr Olivia Gallagher, PhD
Dr Gallagher is the Associate Dean (Clinical) in the SNM, supporting the Executive Dean and the Executive Team in providing strategic operational leadership for core SNM activities, including strategic planning and management of clinical placements and simulation-based learning.

FUNDED PROJECTS

- (2021-2023) Novel development of a serious game targeting preparedness of clinician response to operations during the COVID-19 pandemic (WA Department of Health), $224,449
- (2021-2023) Virtual reality-enhanced tactical parachute training (Department of Defence), $346,145
- (2021-2023) Development and evaluation of a novel obstetrics training program leveraging virtual reality technology for paramedics, volunteer ambulance officers and paramedic students (St John Ambulance WA), $49,658
- (2021) Informing Detailed Design of Emergency Management and Response Virtual Simulation for the Western Australian Emergency Management Training Centre (Department of Fire and Emergency Services), $53,702
- (2020-2023) The development of online, gamified substance awareness educational content (Sideffect Australia; Australian Council for Health, Physical Education and Recreation), $690,859
- (2020-2022) Early identification of and appropriate response to aggressive behaviour for hospital workers (WA Department of Health), $49,853
- (2019) Opening new choreographic opportunities through 3D virtual dancers performing in mixed reality (Department of Local Government, Sport and Cultural Industries), $35,000
- (2019) Augmented Reality Child Health Interactive Experience: A digital gaming platform for paediatric oncology patients to reduce hospitalisation/treatment-related anxiety and depression (Perth Children's Hospital; Telethon Kids Institute), $29,600
- (2019) Consultative development of a virtual reality platform to train and prepare exercise physiologists for Graded Exercise Stress Test scenarios and incidences (Edith Cowan University), $4,830
- (2018) Utilising Virtual Reality to enhance student learning in the forensic environment (WA Police), $5,000
- (2017-2018) The application of virtual reality to train and prepare paramedics for mass/multi casualty incidents (St John Ambulance WA), $74,700

HIGHER DEGREE RESEARCH STUDENT PROJECTS

PhD

- Aggression and violence de-escalation training using virtual reality technology for front line emergency department healthcare professionals and students
- Out-of-hospital immersive birthing simulation training for paramedics and ambulance officers using virtual reality technology

Masters by Research

- Efficacy of smart-bag ventilations compared to standard adult and paediatric bag-valve ventilations during cardiopulmonary resuscitation
- Operational preparedness for medical management of major incidents: A comparison of traditional and digital mass casualty training modalities for out-of-hospital responders
- Pilot evaluation of a novel pandemic preparedness serious game for paramedics and paramedicine students
- Pilot evaluation of a novel pandemic preparedness serious game for nurses and nursing students
- The use of simulation-based learning experiences to decrease anxiety and increase confidence and preparedness for clinical placements for speech pathology students

RECENT SIDTG PEER-REVIEWED PUBLICATIONS

- Mills, B., Hill, M., Miles, A., Smith E., Afrifa-Yamoah, E., Reid, D., Rogers, S. & Sim, M. (2022) Calling an ambulance for non-emergency medical situations: Results of a cross-sectional online survey from an Australian nationally representative sample. Emergency Medicine Australasia. Doi: 10.1111/1742-6723.14086
- Hill, M., Flanagan, B., Mills, B. & Hopper, L. (2022) Paramedic training, experience, and confidence with out-of-hospital childbirth (OOHB) in Australia. Australasian Emergency Care. Doi: 10.1016/j.auec.2022.08.008
- Nicholas J., Mills B., Hansen S., Bright S., Boyd H., Brook L., Watson J. & Hopper L. (2022) Developing an alcohol and other drug serious game for adolescents: Considerations for improving student engagement. Australian & New Zealand Journal of Public Health. Doi: 10.1111/1753-6405.13287
- Hill, M., Miles, A., Flanagan, B., Mills, B. & Hopper, L. (2022) Out-of-hospital births and the experiences of emergency ambulance clinicians and birthing parents: a scoping review protocol. BMJ Open. 12:e062313
- Mills, B., Hill, M., Miles, A., Smith, E., Afrifa-Yamoah, E., Reid, D., Rogers, S. & Sim, M. (2022) Ability of the Australian general public to identify common emergency medical situations: Results of an online survey of a nationally representative sample. Australasian Emergency Care. Doi:10.1016/j.auec.2022.04.002
- Spring-Walsh, B., Gardiner, F., Bloxsome, D., Ford, D., Mills, B., Laws, S. (2022) A cohort comparison study on women in threatened preterm labour given Nifedipine or Nifedipine and Salbutamol tocolysis in aeromedical retrieval. Air Medical Journal. 41:3, 298–302
- Smith, E., Holmes, L., Larkin, B., Mills, B. & Dobson, M. (2022) Supporting volunteer firefighter wellbeing: Lessons from the Australian 'Black Summer' bushfires. Prehospital and Disaster Medicine. 1-4. Doi:10.1017/S1049023X22000322
- Hill, M., Smith, E. & Mills, B. (2022) Work-based concerns of Australian frontline healthcare workers during the first wave of the COVID-19 pandemic. Australian and New Zealand Journal of Public Health. 46:1, 25–31.
- Hill, M., Smith, E. & Mills, B. (2021) Willingness to work amongst Australian frontline healthcare workers during Australia's first wave of COVID-19 community transmission: Results of an online survey. Disaster Medicine and Public Health Preparedness. 1–7. Doi: 10.1017/dmp.2021.288.
- Smith, E., Hill, M., Anderson, C., Sim, M., Miles, A., Reid, D. & Mills, B. (2021) Lived experience of emergency healthcare utilization during the COVID-19 pandemic: A qualitative study. Prehospital and Disaster Medicine. 36:6, 691–696.
- Bartlett, D., Hansen, S., Cruickshank, T., Rankin, T., Zaenker, P., Mazzuchelli, G., Gaston, M., Du Ploy, D., Minhaj, Z., Errey, W., Rumble, T., Hay, T., Miles, A. & Mills, B. (2021) Effects of sleepiness on clinical decision making amongst paramedic students: a simulated night shift study. Emergency Medicine Journal. 39:1, 45–51.
- Anderson, C., Pooley, J., Mills, B., Anderson, E. & Smith, E. (2020) COVID-19: Do paramedics have a professional responsibility to work during a pandemic? A qualitative exploration of community member expectations. Disaster Medicine and Public Health Preparedness. 14:3, 406–412.
- Mackinnon, K., Everett, T., Holmes, L., Smith, E. & Mills, B. (2020) Risk of psychological distress, pervasiveness of stigma and utilisation of support services: Exploring paramedic perceptions. Australasian Journal of Paramedicine. 17. Doi: 10.33151/ajp.17.764.
- Ford, D., Mills, B., Ciccone, N. & Beatty, S. (2020) Does Direct Helicopter Retrieval Improve Survival of Severely Injured Trauma Patients from Rural West Australia? Air Medical Journal. 39:3, 183–188.
- Miles, A., Hansen, S. & Mills, B. (2020) A simulated night shift for undergraduate paramedicine students: Lessons learnt and the perceived value towards learning. Australasian Journal of Paramedicine. 17. Doi: 10.33151/ajp.17.732.
- Mills, B., Dykstra, P., Hansen, S., Miles, A., Rankin, T., Hopper, L., Brook, L. & Bartlett, D. (2020) Virtual reality triage training can provide comparable simulation efficacy for paramedicine students compared to live simulation-based scenarios. Prehospital Emergency Care. 24:4, 525–536.
- Mills, B., Hansen, S., Nang, C., McDonald, H., Lyons-Wall, P., Hunt, J. & O'Sullivan, T. (2019) A Pilot Evaluation of Simulation-Based Interprofessional Education for Occupational Therapy, Speech Pathology and Dietetic students: Improvements in Attitudes and Confidence. Journal of Interprofessional Care. Doi: 10.1080/13561820.2019.1659759

RECENT ACCOLADES

SIDEFFECT

Gamified online substance awareness training for high school aged children

- Merit Award Winner (runner-up); Australian Information Industry Association National iAwards, 2022 (Not-for-Profit/Community Solution category)
- Finalist; Australian Information Industry Association National iAwards, 2022 (Government & Public Sector Solution category)
- Winner; 31st West Australian Information Technology and Telecommunication Alliance INCITE Awards Winner, 2022 (Research & Innovation [Industry] Project of the Year category)
- Merit Award Winner (runner-up); 31st West Australian Information Technology and Telecommunication Alliance INCITE Awards, 2022 (Social Impact category)

MASS CASUALTY TRAIGE VR SIMULATOR

- Winner; ACS Digital Disruptor Awards Finalists, 2019 (Skills Transformation of Work Teams (Large))
- Winner; 28th West Australian Information Technology and Telecommunication Alliance INCITE Awards, (Most Transformative Impact on Education)
- Winner; Vice Chancellor's Inspiring Staff Award, Teams.
- Finalist; Serious Games Showcase and Challenge Australasia
- Finalist; Australian Information Industry Association National iAwards (Community & Consumer Markets)
- Finalist; 28th West Australian Information Technology and Telecommunication Alliance INCITE Awards (Most Innovative Enabler in Health Care)

MEDIA RESOURCES

SIDEFFECT

Gamified online substance awareness training for high school aged children

- Project synopsis - https://www.youtube.com/watch?v=7SCVdqgZTe8 (2 mins 10 secs)
- Game trailer - https://vimeo.com/691354240 (4 mins)
- Mock classroom teacher facilitation – https://vimeo.com/691347040 (2 mins 51 secs)
- Mock classroom student responses – https://vimeo.com/691349536 (1 min 39 secs)
- Split screen video - https://vimeo.com/693055321 (58 secs)
- Interview Dr Ian Lillico - https://vimeo.com/691358749 (1 min 57 secs)

DE-ESCALATION OF AGGRESSIVE PATIENTS

- VR game trial playthrough - https://vimeo.com/764094865 (49 secs)

MASS CASUALTY TRAIGE VR SIMULATOR

- Ch 9 News - https://www.youtube.com/watch?v=AROwP4GLFEU (2 mins 42 secs)
- Ch 7 News - https://www.youtube.com/watch?v=_ZyA7cWKZ9E&feature=youtu.be (1 min 36 secs)

TACTICAL PARACHUTE TRAINING FOR DEFENCE PERSONNEL

- First-person perspective - https://vimeo.com/764099397 (1 min 2 secs)
- Third-person perspective - https://vimeo.com/764100750 (58 secs)

AUGMENTED REALITY CHILD HEALTH INTERACTIVE EXPERIENCE (ARCHIE)

- ARCHIE Project Overview - https://vimeo.com/693960415 (1 min 59 secs)
- ARCHIE Project Run-through - https://vimeo.com/693894133 (6 mins 3 secs)