# HIRAC Report

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| 1. Hazard Management Details – General | |
|---|---|
| This form relates to OHS Procedure – *Hazard Identification, Risk Assessment and Control (HIRAC)* | |
| School / Work Location: | **Ballarat Tech School (Fed College)** |
| Name of Person(s): | Liam Mudge |
| Date Conducted: | 25/02/2025 |
| Last Reviewed: | 06/03/2024 |
| Next Review Due: | March 2026 |

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| Description of Use: | Summary of Key Risks: (Refer to appropriate subsections) |
|---|---|
| The Ballarat Tech School (BTS) delivers a range of STEM curriculum projects, some of these activities may be hazardous to user's health if safety procedures and lab etiquette are not followed.<br>Augmented & Virtual Reality (AR & VR) involves the interaction of and engagement with a digital rendered environment. Completely digital in the case of VR and overlaying digital content on a real-world view with AR. Often done using a Head Mounted Display (HMD) to immerse the user in said digital landscape for a myriad of uses.<br>Equipment covered by this HIRAC includes:<br>• HoloLens<br>• HTC Vive<br>• Foldable Cardboard (Google Cardboard)<br>• Oculus/Meta Headsets | • Entanglement<br>• Electricity<br>• Slips/trips/falls<br>• Human/Biological |

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## *Risk Assessment Matrix*

**Assessing OHS Risks**

Risk assessments in matters of Occupational Health and Safety* are based on 2 key factors:

- The severity of any injury/illness resulting from the hazard(s), and
- The likelihood that the injury/illness will actually occur.

**Assessment of risk level based on likely severity and probability of harm*

| | | LIKELIHOOD | | | |
|---|---|---|---|---|---|
| | | **Very Unlikely** Could happen, but probably never will | **Unlikely** Could happen, but very rarely | **Likely** Could happen sometime | **Very likely** Could happen any time |
| SEVERITY | Death or permanent disability | MEDIUM | HIGH | EXTREME | EXTREME |
| | Long-term illness or serious injury | LOW | MEDIUM | HIGH | EXTREME |
| | Medical attention and short-term incapacity | VERY LOW | LOW | MEDIUM | HIGH |
| | First aid needed | VERY LOW | VERY LOW | LOW | MEDIUM |

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| 2. Documentation | | |
|---|---|---|
| **Relevant Legislation/Standards** | **Y / N** | **Comments** |
| **Key reference material:** | | • Safety of domestic virtual reality systems<br>• AS/NZS 3760:2022 In service safety inspection and testing of electrical equipment.<br>• Bingcheng Wang, P.-L. P. R., Lili Dong. (2017). Effects of Controller and Body Posture On Simulator Sickness and Visual Fatigue in Virtual Reality. Paper presented at the Proceedings of The 2nd Asian Conference on Ergonomics and Design 2017.<br>• Park, W. D., Jang, S. W., Kim, Y. H., Kim, G. A., Son, W., & Kim, Y. S. (2017). A study on cyber sickness reduction by oculo-motor exercise performed immediately prior to viewing virtual reality (VR) content on head mounted display (HMD). Journal of Vibroengineering, 14.<br>• Sharma, A., Bajpai, P., Singh, S., & Khatter, K. (2017). Virtual Reality: Blessings and Risk Assessment. arXiv preprint arXiv:1708.09540.<br>• Spiegel, J. S. (2017). The Ethics of Virtual Reality Technology: Social Hazards and Public Policy Recommendations. Science and engineering ethics, 1-14.<br>• Penumudi, S. A., Kuppam, V. A., Kim, J. H., & Hwang, J. (2020). The effects of target location on musculoskeletal load, task performance, and subjective discomfort during virtual reality interactions. Applied Ergonomics, 84, 103010.<br>• Al Tawil L, Aldokhayel S, Zeitouni L, Qadoumi T, Hussein S, Ahamed SS. Prevalence of self-reported computer vision syndrome symptoms and its associated factors among university students. European Journal of Ophthalmology. 2020;30(1):189-195. doi:10.1177/112067211881511<br>• Vive Safety and Regulatory Guide |

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| 3. Hazards | | | | |
|---|---|---|---|---|
| **Hazards Inspected** | **Initial Risk** | **Description of Risk** | **Control Measures** | **Residual Risk** |
| ***ENTANGLEMENT***<br>Can anyone's hair, clothing, person, become entangled with moving parts or cable (data and power) of the equipment? | Medium | • Long hair, loose clothing, and jewellery could become entangled in the moving parts of the equipment or could knock over other equipment.<br>• Operator may become tangled in cables. | • Ensure hair, loose clothing, and jewellery are kept clear of moving parts when in use.<br>• Ensure inappropriate jewellery and accessories (e.g. bracelets) are not worn when operating equipment.<br>• Spotter used to assist ensuring operator does not become tangled.<br>• Safety introduction conducted at beginning of session. | Low |
| ***IMPACT***<br>Can anyone be injured by equipment becoming dislodged or slipping out of users grasp? | Medium | • Controllers and other equipmet may become dislodge or thrown during use | • Consult manufactures instructions.<br>• Use securing straps to prevent controllers being thrown/slipping.<br>• Use of "Chaparone" system<br>• Safety introduction conducted at beginning of session. | Low |

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| Hazards Inspected | Initial Risk | Description of Risk | Control Measures | Residual Risk |
|---|---|---|---|---|
| ***SLIPS/TRIPS/FALLS***<br>Can anyone using the equipment, or in the vicinity of the equipment, slip, trip or fall due to:<br>• Poor housekeeping, e.g. spillage in the vicinity?<br>• Obstacles being placed in the vicinity of the equipment? | Medium | • Inappropriate placement of objects (e.g. Chairs, bags etc) in the immediate vicinity of the users may result in trip hazard.<br>• Interactions with virtual and real-world obstacles may result in the user losing balance or colliding with obstacles. Such as chairs, tables, and other furniture | • Ensure appropriate cleaning and housekeeping practices are maintained to minimise the risk of a slip, trip or fall.<br>• Spotters used to ensure user does not collide with obstacles.<br>• Set up of virtual "Chaperone" system prior to use. To identify obstacles in the room.<br>• Safety introduction conducted at beginning of session. | Low |

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| Hazards Inspected | Initial Risk | Description of Risk | Control Measures | Residual Risk |
|---|---|---|---|---|
| ***Ergonomic*** | Medium | • Given higher amount of shoulder flexion angle, neck flexion moment, muscle activities of the neck and shoulder, excessive vertical target locations may cause musculoskeletal loading and discomfort during VR interactions | • Identifying the potential for repetitive strain to activity in virtual environment prior to entering VR.<br>• Encourage participants to stop, rest and/or stretch if uncomfortable.<br>• Limit the amount of time on VR to reduce exposure to repetitive movement. | Low |
| **Hazards Inspected** | **Initial Risk** | **Description of Risk** | **Control Measures** | **Residual Risk** |
| ***ELECTRICITY***<br>Can anyone be injured or burnt due to:<br>• Damaged or poorly maintained electrical leads, cables or switches?<br>• Water near electrical equipment? | Medium | • Damaged or frayed electrical cables pose an electrical hazard.<br>• Water/Drinks may spill.<br>• Excess cleaning fluids | • Ensure only the minimum amount of cleaning fluids used to successfully achieve outcomes.<br>• Restrict drinks around electrical equipment.<br>• Isolate power and mop up any spills as soon as practicable. | Low |

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| Hazards Inspected | Initial Risk | Description of Risk | Control Measures | Residual Risk |
|---|---|---|---|---|
| ***Biological or Human***<br>Is a hazard likely due to biological or human activity | Low | • VR headsets used by multiple people may pose risk of cross contamination via use.<br>• Sharing of the HMD by multiple users has the potential to pass on contact of body fluids such as sweat and potential pathogens. | • Unwell participants excluded from experience.<br>• Use of disposable face shields to create physical barrier between user and headset. | Low |

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| Hazards Inspected | Initial Risk | Description of Risk | Control Measures | Residual Risk |
|---|---|---|---|---|
| ***Cyber Sickness*** | Medium | • Commonly referred to as 'Cyber Sickness' users can suffer eye strain, nausea and disorientation. During and after engaging with a VR environment through a HMD.<br>• Cyber Sickness may result in users becoming nauseated, potentially resulting in vomiting.<br>• Experience could trigger other medical conditions such as epilepsy etc | • Limit time users occupy VR environment to avoid cyber sickness.<br>• Begin activity from a sitting position if necessary. Then progress to standing.<br>• Users to engage in appropriate Oculo-motor exercises prior to using VR for extended periods of time,<br>• Users able to remove the HMD if they begin to feel symptoms of cyber sickness.<br>• Ensure adequate cleaning facilities available should users become ill (thereby avoiding slip/trip hazard.)<br>• Safety introduction conducted at beginning of session.<br>• Use of 20-20-20 rule to reduce eye strain.<br>• In the event of Cyber Sickness occuring remove user from VR environment for at least 15 minutes.<br>• Alert students to other existing medical conditions that coiuld be triggered by VR environments and provide an opportunity for them to speak to the facilitator so an informed decision on participation can be made | Low |

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| 4. Risk Assessment Signoff | | |
|---|---|---|
| Authorised By:<br><br>Albert Ferguson | Signature: AFerguson | Date: 24/03/2025 |