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| UTS SAFE WORK METHOD statement (SWMS) |

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| 1. **FACULTY/SUBJECT** | |
| Faculty/Subject title | 41013 Industrial Robotics |
| Subject supervisor/coordinator | Gavin Paul |
| SWMS prepared by | Matthew Chua, Claudia |

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| 1. **WORK ACTIVITY DESCRIPTION** | | | | | | |
| Describe the work activity E.g. Operating, Handling, Using.. Include names of hazardous equipment, substances or materials used,  and any quantities and concentrations of substance(s) or reaction products. | The Dual-Arm Plate Cleaning Robot automates dishwashing using two 6-DOF robotic arms near a kitchen sink. The robots take turns scrubbing, rinsing, and wiping plates. Both arms scrub, dunk the plate in water, while the other handles the plate, dries it with a towel, and places it in a rack. Pre-programmed motions ensure thorough, efficient cleaning.  The system is controlled via a computer interface with safety protocols, including an emergency stop and a clear workspace. The code is fully simulated before real-world use to ensure smooth and safe operation. | | | | | |
| 1. HAZARDS: Choose those hazard types that will need to have control measures in Section 4 | | | | | | |
| **Work Environment**   * Working in Remote Locations * Working Outdoors/fieldwork * Clinical/Industrial setting * Poor ventilation/Air quality * Temperature extremes * Working at Height * Slip/Trip/Fall hazards | | **Plant**   * Noise * Vibration * Working with compressed air * Lifts Hoists or Cranes * Moving parts (Crushing,friction, cut, stab, shear hazards) * Pressure Vessels or Boilers | | **Chemical**   * Hazardous Chemicals use * Skin/eye irritant * Sensitiser * Mutagen * Carcinogen * Toxic to reproduction * Aquatic toxicity * Toxic * Corrosive * Dangerous when wet | | **Ergonomic/Manual Handling**   * Repetitive or awkward movements * Lifting heavy objects * Over reaching * Working above shoulder or below knee height * Poor workstation set up |
| **Electrical**   * Plug in equipment * High voltage * Exposed wiring * Exposed conductors | | **Radiation**   * Ionising Radiation * Non-ionising radiation (Lasers, Microwaves, Ultraviolet light) | | **Biological**   * Sharps/Needles * Cytotoxins * Pathogens/infectious materials * Infectious materials * Communicable diseases * Animal/insects * Work with fungi/bact/viruses | | **Psychosocial**   * Aggressive or violent clients/students * Working in isolation * Working with timeframes * Staffing issues |
| 1. **CONTROLS MEASURES: Choose those that apply for hazards identified** | | | | | | |
| **Eliminate/Isolate/Substitute / Engineering Controls**   * Remove hazard * Restrict access * Redesign equipment * Guarding / Barriers / Fume Cupboard / exhaust * Biosafety cabinet * Use safer materials/substances * Ventilation * Regular maintenance of equipment * Redesign of workspace / workflow | | | **Admin specific: Licenses/permits Work Methods**   * Training Information or Instruction * Licensing or certification of operators * Test and tag electrical equipment * Restricted access * Regular breaks * Task rotation * Work in pairs * Document Chemical risk assessment * Ladder / Sling register | | **Emergency Response Systems**   * First aid kit * Chemical spill kit * Safety shower * Eye wash station * Emergency Stop button * Remote Communication Mechanism | |
| **Other controls not listed** | | | | | | |
| 1. **PPE REQUIRED (Tick those that apply)** | | | | | | |
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| 1. **EMERGENCY EQUIPMENT** | | | | | | |
| http://www.orr.uts.edu.au/images/pictograms/equipment/eyewash.pnghttp://www.orr.uts.edu.au/images/pictograms/equipment/spill.pnghttp://www.orr.uts.edu.au/images/pictograms/equipment/shower.png | | | | | | |
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| 1. **work activity steps** |
| **before you start:**   * Check for any clutter, water spills or potential hazards around the workspace. * Check the chemical watertank (if used) to ensure it is secure and leak-free. * Inspect both robotic arms and associated equipment for any visible damage or malfunction. * Confirm all cables and connections are secure, and that the robot is correctly plugged in. * Notify lab supervisor and surrounding people that you will be operating the robot   **steps in work activity:**   1. Ensure that the light curtain safety system is activated and functioning before powering on the robot. 2. Run the Robotics Toolbox by Peter Corke to control and simulate the dual-arm system. 3. Simulate the code before running it in real life to ensure the code is error-free and the robot functions as expected. 4. Initialise both robotic arms, ensuring they are correctly calibrated for the dishwashing task. 5. Connect laptop to Raspberry Pi to upload and control the cleaning robot's code. 6. Compile code to prepare the robots for real-time operation. 7. Make sure the movement space for both robotic arms is free of obstructions, including dishes, utensils, or objects. 8. Double-check for water spills near the sink and the robot's base, cleaning any that are present to avoid hazards. 9. Keep your hand on or near the emergency stop button at all times. 10. Run the code.   **emergency procedures:**   * Press emergency button * Notify security or dial 6 using the UTS internal phone   **training required:**   * Complete the lab induction |
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| 1. **sign off** | | |
| **prepared by:**  **NAME: Matthew Chua, CLAUDIA** | **Lab Supervisor**  **Name:** | **Date: 9/10/2024**  **Review Date: 9/10/2024** |