|  |
| --- |
| UTS SAFE WORK METHOD statement (SWMS) |

|  |  |
| --- | --- |
| 1. **FACULTY/SUBJECT** | |
| Faculty/Subject title | 41013 Industrial Robotics |
| Subject supervisor/coordinator | Gavin Paul |
| SWMS prepared by | Finn Linstrom |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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. | This activity entails the use of two Dobot robots to pick and place and perform work. The first robot will be used to transport raw printed circuit boards (PCB) from a conveyer belt to a custom vice to hold the PCB in place. A second Dobot will have a laser tooltip attached to its end effector to etch paths into the top surface of the PCB. The suction cup tooltip will be used to attach the PCB’s to the robot. As a result, time must be allowed to cool the surface of the board after work, to avoid melting the rubber of the tooltip. An external camera will be used to identify different types of boards to perform specialised traces and/or respond to unexpected boards/activity. | | | | |
| 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)** | | | | | |
| http://www.orr.uts.edu.au/images/pictograms/protection/hand.pnghttp://www.orr.uts.edu.au/images/pictograms/protection/face.pnghttp://www.orr.uts.edu.au/images/pictograms/protection/eye.pnghttp://www.orr.uts.edu.au/images/pictograms/protection/hearing.pnghttp://www.orr.uts.edu.au/images/pictograms/protection/foot.pnghttp://www.orr.uts.edu.au/images/pictograms/protection/ppe.png | | | | | |
|  | | | | | |
| http://www.orr.uts.edu.au/images/pictograms/protection/respiratory.pnghttp://www.orr.uts.edu.au/images/pictograms/protection/head.pnghttp://www.orr.uts.edu.au/images/pictograms/protection/hair.png | | | | | |
|  | | | | | |
| 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 | | | | | |
|  | | | | | |

|  |
| --- |
| 1. **work activity steps** |
| **before you start:**   * Ensure closed shoes and eye protection is worn * Check the state of the power outlet * Check the area around the robots * Check the end effector tooltips are configured correctly * Test operation via teach pendent * Test functionality of e-stop switch * Test the operation of the tooltips (suction cup and laser)   **steps in work activity:**   1. Turn on the robots and establish connection via ROS to robots, conveyor belt and camera 2. Load the conveyor belt with PCB’s 3. Execute the code, monitor for issues while awaiting completion 4. Evaluate the quality of the final workpiece/s 5. Turn off the robots and packup workspace   **emergency procedures:**   * Press emergency button * Notify security or dial 6 using the UTS internal phone   **training required:**   * Workspace Induction assessment * Software (MATLAB or CPP) and ROS understanding |

|  |  |  |
| --- | --- | --- |
| 1. **sign off** | | |
| **prepared by:**  **NAME: FInn Linstrom** | **Lab Supervisor**  **Name: Michael Lee** | **Date: 28/04/22**  **Review Date:** |