COLLABORATIVE ROBOT WORKSTATION RISK ASSESMENT AND SAFE WORK METHOD STATMENTS

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# Risk assessment

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hazard | Description | Pre control measures | | | Control measure |  | Post control measures |  |
| Likelihood | Consequence | Risk level | Likelihood | Consequence | Residual risk level |
| Human - robot collisions and pinch points | While the robot is operating it may collide with workers within its workspace.  For example, fingers may be caught between regions of the robot that can cause injury. | Very likely | Major | Very High | Collision avoidance using sensors and knowledge of its environment. In the event that these precautions are not sufficient, fences are used to keep the robot from wondering from the workspace.  Additionally, an E-stop button in an easily accessible location to immediately shut off power to the robot stopping further damage. | Highly unlikely | Minor | Very Low |
| Damage to other equipment | While the robot is operating it may collide with equipment causing damage to itself or the equipment | Very likely | Major | Very High | Collision avoidance using sensors and knowledge of its environment to stop the robot when moving if an obstacle is in the way and when planning the motion for the arm, move around obstacles.  Additionally, an E-stop button in an easily accessible location to immediately shut off power to the robot stopping further damage. | Highly unlikely | Minor | Very Low |
| Electrical fire | Fire due to electrical fault | Unlikely | Catastrophic | High | Fire extinguisher close to workstation to be used to immediately put the fire out and e-stop button to stop the source of the fire. Additionally, smoke alarms will be mounted above the workspace to detect a fire and notify the required parties. | Unlikely | Moderate | Low |
| Robot falling over | Due to “tripping hazards”, uneven ground or being bumped the robot may fall over | Unlikely | Major | Moderate | Collision avoidance will stop the motion of the robot when a “tripping hazards” is in the way.  Workspace ground to be constructed and tested to be level when workspace is commissioned.  Robot arm to be in tucked position to avoid bumps and make its travel more stable due to its centre of gravity being closer to its base. | Highly unlikely | Major | Low |
| Laser beam | Incorrect use of the robot’s laser scanner may lead to exposure to dangerous radiation | Unlikely | Minor | Low | Regular check-ups and maintenance on the laser and its housing.  Class 1 Laser and radiation warning sign. | Highly unlikely | Minor | Very Low |

# Safe Work Method Statement

|  |  |  |  |
| --- | --- | --- | --- |
| Description of work: Robot workspace clean-up  Project manager: Gavin Paul | | Project: Assignment 2 | |
| SWMS prepared by; Joshua Leo, Johnson Nguyen | **Signature:**    **Date: 18/05/2020** | **SWMS approved by; Joshua Leo, Johnson Nguyen** | **Signature: Joshua Leo**    **Date: 18/05/2020** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Activity | Hazard/ threat | Pre control measures | | | Control measure | Post control measures | | | Remaining action | Person who will ensure the controls are implemented |
| Likelihood | Consequence | Risk level | Likelihood | Consequence | Residual risk level |
| Entering the workspace | Unwanted robot motion colliding with people or other injuries caused by robot faults/malfunction | Possible | Moderate | Moderate | Make sure no power is running to the robot by ensuring the e-stop is pressed, and there are no faults logged for the robot of that work cell. | Highly unlikely | Minor | Very Low | Report any faults or identified damages to the robot. | Project Manager and demonstrator |
| Activating the robot | Unwanted robot motion colliding with people | possible | Moderate | Moderate | Worker must activate the robot from outside of the workspace | Highly unlikely | Moderate | Low | Be aware of workspace extents | Project Manager and demonstrator |
| Robot completing task/ running (motion) | Robot mishandling object | Possible | Moderate | Moderate | Robot has been recently maintained and calibrated to pass companies safety regulations.  Make sure the robots gripper is in good condition. | Unlikely | Minor | Low | Report any faults or identified damages to the robot. | Project Manager and demonstrator |
| Powering off robot or doing maintenance | Unwanted robot motion colliding with people | Unlikely | Minor | Low | Make sure e-stop button is pressed so no power is running. | Highly unlikely | Minor | Very Low | Report any faults or identified damages to the robot. | Project Manager and site maintenance |

# 

# Appendix

## References

Docs.fetchrobotics.com. 2020. Safety — Fetch & Freight Research Edition Melodic Documentation. [online] Available at: https://docs.fetchrobotics.com/safety.html [Accessed 18 May 2020].

Prioritization of the human health and safety loss factor subject to offshore pipeline accidents - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Risk-Assessment-Matrix-Model-of-O-G-Pipeline-Integrity-Management-4\_tbl1\_331266532 [accessed 18 May, 2020]

## Risk matrix used for the risk assessment and safe work method statements

