



PR2 Risk Assessment Form

School Assessment No:	INFRA 37
Title of Activity:	Working with PR2 robot
Location(s) of Work:	Assisted Living Lab; Bayes Centre 1.25

Brief Description of Work:

Working with the PR2 robot for navigation, sensing and manipulation.



Hazard Identification:

Hazard(s)	Present Risk Evaluation L/M/H	Control Measures (i.e., alternative work methods / mechanical aids / engineering controls, etc.)	Risk Evaluation after control L/M/H
Damage caused by inexperienced user	H	No user is allowed to operate the robot without having completely read and understood the PR2 operation manual, completed an induction session with an experienced and trained user, read and signed with countersignature this Risk Assessment form, or following the safety procedures described herein.	L
Impact between robot and people or objects in its path (e.g., being struck by the robotic arm)	M	<p>Only authorised and trained operators may work with the robot. This is a 2-man operation.</p> <p>The emergency STOP button must be always within easy reach of the operator.</p> <p>The operators should be familiar with safe code of working practice for working with the robot.</p> <p>No unauthorised person should enter the robot's working envelope when robot operation is underway.</p>	L
Crushing and trapping (e.g., part of the body being trapped between the robotic arm joints)	H	<p>Those working in close proximity to the robot should be aware of areas of possible injury, such as the small gaps in rotational joints.</p> <p>The robot is mobile, and care must be taken at all times when it is operational to ensure people are kept outside its working envelope.</p>	L

		<p>Operators should ensure they do not get trapped between robot and other surfaces.</p> <p>All bystanders should be kept away from the area of operation.</p> <p>One of the operators should always be watching the robot and prepared to issue warnings or stop the unit if the risk of injury is imminent.</p> <p>Do not operate the robot near areas with unprotected sudden height drops (e.g., steps), where it may topple/fall on bystanders.</p> <p>The emergency STOP button must be always within easy reach of the operator.</p>	
Slipping/tripping	L	<p>Working areas should be kept clear of obstructions.</p> <p>Any spillages should be cleaned up immediately.</p> <p>Any hazards such as trailing cables, defects to floors coverings, faulty lighting etc. should be reported immediately to the Admin Office / Local Safety Adviser or another senior member of staff.</p>	L
Electrical equipment (electrocution)	M	<p>All portable electrical equipment must be safety tested at correct intervals and labelled with the date of test.</p> <p>Electrical cables, plugs should be regularly visually inspected by the user for damage.</p> <p>Any defective equipment should be reported immediately to the Admin Office / Local Safety Adviser or another member of</p>	L

	L	<p>senior staff, then suitably labelled and taken out of use until the repair has been effected.</p> <p>The PR2 operates with higher voltage and current limits than our other robots. In practice however it should not be any more dangerous. Removal of covers and access to internals should only be done in the presence of qualified personnel.</p>	L
Fire	H	<p>PR2 plastic covers are flammable. Keep away from any sources of ignition</p> <p>Lab users must be acquainted with the Fire Routine Procedure for the area.</p>	L
Lifting of unit (back injuries)	H	<p>The unit weighs close to 300Kg. It must not be lifted without a risk assessment and using appropriate lifting aids. Many parts are fragile and require protected during the lifting process. Follow procedures for heavy and bulky loads that present a risk of injury.</p>	L
Moving the unit (tripping/toppling)	M	<p>Do not operate the unit within 1m of any drop-off. Fully disconnect all external connections. Ensure route is clear and manageable. Move slowly and keep passers-by well clear</p>	L

Engineering Controls:

Guarding		Extraction (LEV)		Interlocks		Enclosure	
Other relevant information (incl. testing frequency if appropriate):							

Personal Protective Equipment (PPE):

Eye / Face		Hand /Arm		Feet / Legs		Respiratory	
Body (clothing)		Hearing		Other (Specify)			
Specify the grade(s) of PPE to be worn:							
Specify when during the activity the item(s) of PPE must be worn:							

Non-disposable items of PPE must be inspected regularly, and records retained for inspection

Persons at Risk:

Academic staff	X	Technical staff	X	P'Grad students	X	U'Grad students	X
Maintenance staff	X	Office staff		Cleaning staff		Emergency personnel	
Contractors		Visitors	X	Others			

Additional Information:

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Assessment carried out by:

Name:	Vladimir Ivan	Date:	25/08/2021
Signature:		Review Date:	25/08/2022



Safe system of work – Form SSW

Working with the PR2 robot – INFRA 37

INFRA 12 must be read, understood, and signed off along with this SSW, before use of the robot.

No user is allowed to operate the robot without having completely read and understood the PR2 operation manual, completed an induction session with an experienced and trained user, read and signed with countersignature this Risk Assessment form or following the safety procedures described herein.

The PR2 is a mobile robot of considerable weight and mobility. All operation should be carried out by a team of no less than 2 people, with one being an authorised experienced user.

Do not operate the robot within 1m of any unblocked drop-off (step, floor edge, etc.)

Inexperienced ***or*** unauthorised use is not allowed. When performing experiments/demonstrations including inexperienced personnel, ensure they are aware of the PR2's range of motion, weight and speed. Ensure there is a safety gap or barrier, enabling the Safety Officer to stop the robot in case of an emergency.

Before use, the area should be checked and cleared of unnecessary items. Cables should be neatly routed, and the emergency stop button available for use and the Safety Officer should carry the Wireless Emergency Stop remote and always follow the robot closely.

If any injury occurs, the unit should be stopped, disabled and medical assistance sought.

Once finished: the Wireless Emergency Stop must be pressed, all processes stopped on the robot, execute the robot shutdown procedure, wait for the shutdown beep sequence, and then turn off DC power at the PR2 base.

The emergency phone number is 2222

The nearest First Aid box is in the floor kitchen

Informatics First Aider list can be found on the web at;

<http://www.inf.ed.ac.uk/safety/first-aiders.html>

Verification by users

Sign below to indicate you have read and understood the safe system of work.

Signature:	Date: