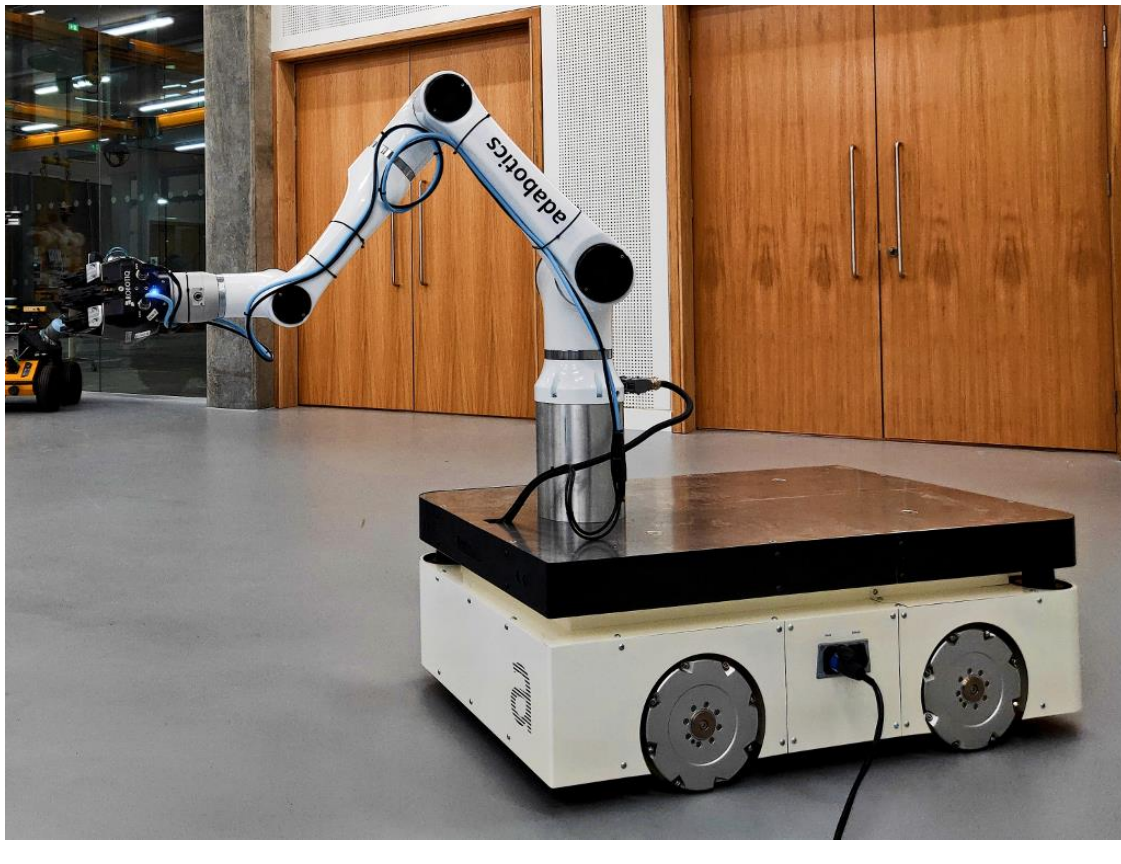


Ada500 Risk Assessment Form

School Assessment No:	INFRA 51
Title of Activity:	Operating the Ada500 Mobile Platform
Location(s) of Work:	Field Robotics Lab; Bayes Centre G.7

Brief Description of Work:

Experimental work using the Ada500 Mobile Platform



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
Impact between robot and people or objects in its path (e.g., being struck by the robot arm)	M	<p>Only authorised and trained operators may work with the equipment.</p> <p>The wireless emergency STOP must be always in hands of the operator with the ability of pressing the STOP button easily.</p> <p>No person should enter the robot's working envelope when the robot is in operation unless authorised and trained operator is present attending control of the robot and the emergency STOP remote.</p> <p>All users must be aware of the working envelope of the robot which includes the motion of the base.</p> <p>The operators should be familiar with safe code of working practice for working with the robot. No unauthorised person should operate the robot.</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>	L
Crushing and trapping (e.g., part of the body being trapped between the robot and a fixed object)	M	<p>Those working near the robot should be aware of areas of possible injury.</p> <p>All trained operators and users should be familiar with the emergency stop behaviour as well as the loss of communication behaviour.</p> <p>Those working with the robot</p>	L

		<p>should avoid putting any body parts underneath the base or in the openings around the wheels.</p> <p>No person should sit or stand on the robot base when the robot arm is installed.</p> <p>All users must be familiar with the operation of the robot using the remote controller. The controller can trigger fast base and arm motion that can only be stopped using the emergency stop. You must not trigger the arm parking motion if the area at the back of the robot is not entirely clear of obstacles.</p>	
Fire caused by the lithium-ion battery pack	L	<p>Users should be familiar with the fire routine for the robot that is summarised as:</p> <ul style="list-style-type: none"> • Letting the fire department fight fires. • Use only Class D fire extinguishers, (copper powder for combating lithium fire). • Do not use any water or any other type of fire extinguisher, as lithium fires react violently with water and combustible substances. <p>The robot on charge should not be left unattended at any point. The approved charger should be turned off and disconnected from the robot.</p>	L
Ejection of parts from the robot due to malfunction, overloading, or crashing into the environment.	M	<p>The emergency STOP remote must be always within easy reach of the operator.</p> <p>No person should enter the robot's working space when the robot is in operation unless authorised and trained operator is present attending control of the robot and</p>	M

		<p>the emergency STOP remote.</p> <p>Care should be taken when carrying load on the robot. The load must not exceed the carrying capacity of the robot. The load must be secured appropriately for its weight, traction of the wheels on the floor, and speed of the robot.</p> <p>The robot should be used only on flat hard surfaces (concrete, wood, tiles, thin carpet, etc.).</p>	
Electric Shock	L	<p>The equipment must be regularly tested for electrical safety.</p> <p>Any changes/adjustments to the equipment can be made only when it is powered off, the shore power is unplugged, and the charger is disconnected.</p> <p>The robot must not be opened (the top cover removed) by unauthorised personnel.</p> <p>When working on the inside of the robot (the top cover is removed), the battery switch must be turned off and the battery connector must be disconnected.</p> <p>Electrical cables, plugs should be regularly inspected by the user for damage.</p> <p>The robot must not be turned on when wet. The robot must not be operated on wet surfaces.</p> <p>Any defective equipment should be reported immediately to the Admin Office/Local Safety Adviser or another member of senior staff, then suitably labelled and taken out of use until the repair has been completed.</p>	L

Slipping/Tripping Hazard	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 floor coverings, faulty lighting etc. should be reported immediately to the Admin Office/Local Safety Advisor or another senior member of staff.</p> <p>When operating the robot with the shore power plugged in, the operator must ensure that the cable does not create tripping hazards and that it does not get trapped under the robot.</p>	L
Fire	L	<p>Lab users must be acquainted with the Fire Routine and Procedure for the area.</p>	L
Cutting Risk	L	<p>Users should be aware of the sharp edges of the outer cover by the wheels.</p> <p>Users should be aware of the sharp edges inside the robot when working with the top cover is removed.</p>	L
Lifting related injuries	L	<p>The robot must not be lifted by the users manually. Always use lifting equipment with suitable safe lifting weight. The weight of the robot with the arm installed is 150kg. Follow procedures for heavy and bulky loads that present a risk of injury.</p> <p>Always install the eyebolts and use appropriate straps for lifting the robot.</p> <p>Any damage or wear to the eyebolts, rope/cablling or the crane should be reported to the Admin</p>	L

		Office/Local Safety Adviser or another member of senior staff, then suitably labelled and taken out of use until the repair has been completed.	
Transportation	M	<p>The robot should be transported on a pallet with wheel stoppers. The eye bolts must be installed, the robot must be securely strapped, and the arm must put in the transport position.</p> <p>The power to the battery must be disconnected using the maintenance switch inside the robot.</p>	L

Engineering Controls: Tick relevant boxes

Guarding	<input checked="" type="checkbox"/>	Extraction (LEV)	<input type="checkbox"/>	Interlocks	<input type="checkbox"/>	Enclosure	<input type="checkbox"/>
Guarding by separation of unauthorized people from the robot's working environment.							

Personal Protective Equipment (PPE):

Eye / Face	<input type="checkbox"/>	Hand /Arm	<input type="checkbox"/>	Feet / Legs	<input type="checkbox"/>	Respiratory	<input type="checkbox"/>
Body (clothing)	<input type="checkbox"/>	Hearing	<input type="checkbox"/>	Other (Specify)			
Specify the grade(s) of PPE to be worn: N/A							
Specify when during the activity the item(s) of PPE must be worn: N/A							

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

Persons at Risk:

Academic staff	<input checked="" type="checkbox"/>	Technical staff	<input checked="" type="checkbox"/>	P'Grad students	<input checked="" type="checkbox"/>	U'Grad students	<input type="checkbox"/>
Maintenance staff	<input checked="" type="checkbox"/>	Office staff	<input type="checkbox"/>	Cleaning staff	<input type="checkbox"/>	Emergency personnel	<input type="checkbox"/>
Contractors	<input type="checkbox"/>	Visitors	<input checked="" type="checkbox"/>	Others	<input type="checkbox"/>		<input type="checkbox"/>

Additional Information:

Authorisation and training are required prior to the use of the Ada500 platform.
--

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 Ada500 robot – INFRA 51

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

INFFA 02 must be read, understood, and signed off along with this SSW, before use of the robot outside of the robotics labs.

No user is allowed to operate the robot without having 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 Ada500 is a mobile robot weighing about 150kgs and can move at 1.5m/s. All operation should be carried out by a team of no less than 2 people, with at least 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 robot's working envelope, weight and speed. Ensure there is a safety gap or barrier, enabling the operator 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 operator should carry the remote controller and always follow the robot closely.

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

When the robot is not used for driving, the remote e-stop should be pressed. If the robot is not used for longer periods, the motor power should be switched on the base.

Once finished: the Emergency Stop must be pressed, all processes stopped on the robot, then base can be switched off.

The robot uses lithium-ion battery. Only use the provided charger. Do not leave the robot unattended when charging. The battery has over current and under voltage so it can be left charging past 100% capacity. The charger can also be used when the robot is operating. When doing this, you must not move the mobile base. Always

unplug the charger before moving the mobile 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: