

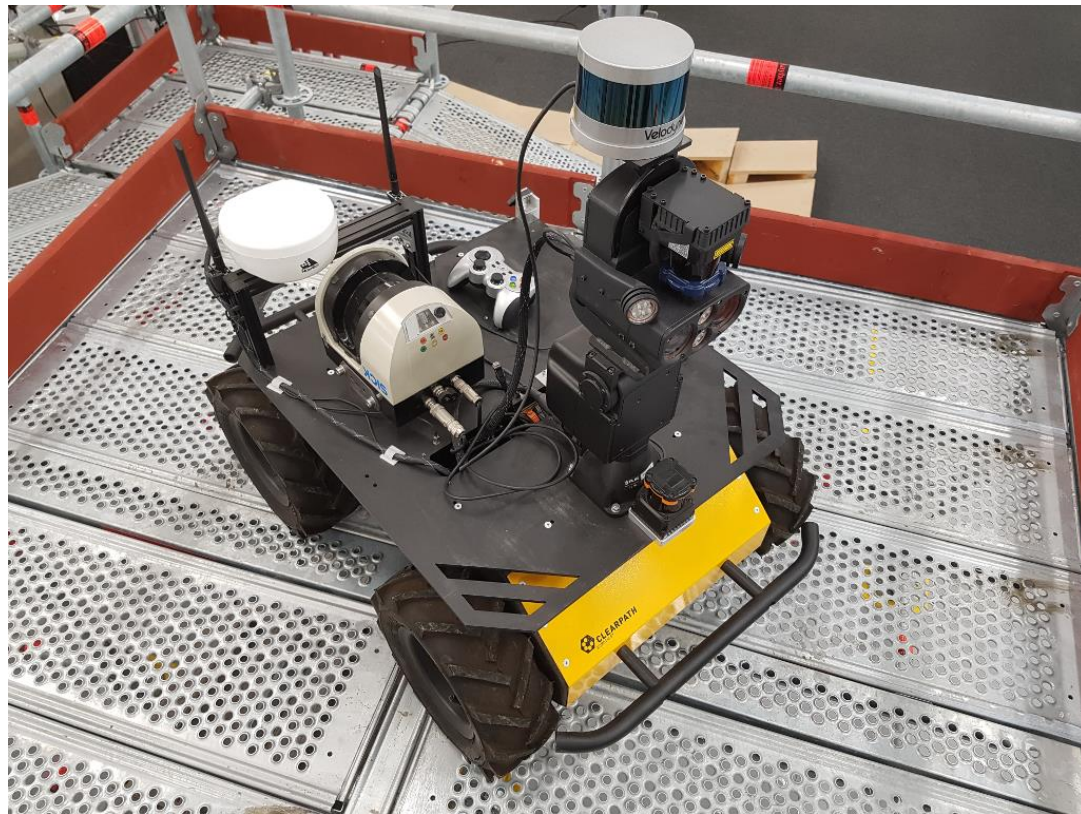


Field Husky Risk Assessment Form

School Assessment No:	INFRA 44
Title of Activity:	Working with the Husky robot
Location(s) of Work:	Field Robotics Lab; Bayes Centre G.7

Brief Description of Work:

Working with the Husky robot for navigation, and sensing.



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 HUSKY 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	L	<p>Only authorised and trained operators may work with the robot. This is a 2-man operation.</p> <p>The operators should be familiar with safe code of working practice for working with the robot. The robot's control software uses a 'dead-man's trigger' i.e., the controller must continuously transmit to the robot to give the robot 'permission' to move. Otherwise, the robot will come to an immediate halt. Operators will be familiar with how this work and that by simply releasing their finger from the button commanding</p>	L

		<p>the robot, the robot will stop moving.</p> <p>When not being actively tested the robot's immobilizing button must always be pressed. Otherwise, the remote controller must be always within the reach of the operator.</p>	
<p>Crushing and trapping (e.g. part of the body being trapped between the wheels)</p>	<p>H</p>	<p>Those working in close proximity to the robot should be aware of areas of possible injury, such as around the wheels.</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 driving path.</p> <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>When not being actively tested the robot's</p>	<p>L</p>

		immobilizing button must always be pressed. Otherwise, the remote controller must be always within the reach of the operator.	
Slipping/tripping/toppling	L	<p>The robot must not be driving on slopes steeper than 30° to prevent toppling. Extra care should be taken when taking turns on a sloped surface.</p> <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>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 effected.</p> <p>The robot uses Lead acid batteries. The batteries must be regularly charged and discharged to ensure a long battery life.</p>	L

		<p>The battery can be replaced. This must be done in a safe and dry environment to prevent short circuiting the power connectors. The procedure is detailed in the user manual must be followed and the battery cover must be closed before the robot is powered up.</p> <p>The robot can also be operated using shore power. This must be done in safe and dry environment. The procedure is detailed in the user manual must be followed. The robot must not be driving when the shore power is connected. Only use of the sensors is allowed.</p> <p>The robot must be fully powered down before replacing the battery or connecting the shore power.</p>	
Fire	H	<p>The robot uses Lead acid batteries which must be charged using the provided charger and the proper charging procedure must be followed.</p> <p>Lab users must be acquainted with the Fire Routine Procedure for the area.</p>	L
Lifting of unit (back injuries)	H	<p>At times it is useful to lift the robot from its wheels during testing. The vehicle can be manually lifted by 2 people and placed on a box. The robot must be</p>	L

		fully shut down before lifting and the immobilizing button pressed.	
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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 Husky robot – INFRA 44

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

INFRA 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 completely read and understood the Husky 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 Husky is a mobile robot weighing about 60kgs and can move at 1m/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 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.

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

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>

