

Customer Details:-

Owner: Josh Hecke (joshua.hecke@connect.qut.edu.au)

Review: Yes

Email: joshua.hecke@connect.qut.edu.au

Endorsement: Yes

Assessment Type: Plant/Equipment

MAPS ID:

Division/Faculty: Faculty of Engineering

QUT Team: School of Electrical Engineering & Robotics

School/Depart: School of Electrical Engineering & Robotics

QUT SubTeam:

Start Date: 8/25/2025

Est End Date: 6/25/2026

Title: Design of small scale Remotely Operated Vehicle - Underwater Robot

Description: This is an risk assessment to support the design of a new small scale ROV on campus.

The primary risks relate to electrical safety during development, manual handling, operation, electrical safety including charging and packing and storage for travel.

Only Tobias Fischer, Joshua Hecke and Scarlet Raine will be able to operate this device during development and testing, due to its experimental nature. Other team members can operate this vehicle after contacting said operators and receiving a induction.

Main Risks-

5200mAh 14v LIPO Battery Use and Handling

Operation and Handling around water

IF USED

Safe use and Storage of Dichtol Waterproofing

Ensure-

S9 lab techs are aware of LIPO presence if battery is on campus for safe storage and charging.

In addition to this risk assessment, Approval of any commercial areas(i.e qut pool) needs to be organized with the appropriate body accordingly.

Location Details:-

Campus	Building	Floor	Room	Additional Info
Off Campus				These are operated on-water in the field at approved locations(A key example would be QUT Pool or Personal Pool)
Gardens Point	S Block	Level 11	1145-Post-Graduate Lab.	Mobile Robots Lab Soldering Station

Hazard Details:-

Haz ID	Hazard	Cause of Harm	What could go wrong	L	C	Risk Score	Hide Items
79996	Slip-Trip-Fall	Slippery surfaces	Slipping getting in and out of boat, on boat ramps or on shore close to water.	Possible	Minor	Low	
		Control	Hierachy: Administration Control: Assess conditions before moving around location. Must wear suitable footwear according to location (e.g. shoes, or wet booties). Only hop onto boat once fully secured. Do not run. Use multiple people to carry equipment on shore or loading boat.				
79997	Plant and Equipment	Operation	Rotating propellers - cuts, injuries, equipment in motion.	Unlikely	Minor	Low	
		Control	Hierachy: Engineering Control: For the BlueRov, the remote operator interface controls the motors and touching any control will disable the system and put it into idle mode.				
		Control	Hierachy: Isolation Control: On the BlueRov, the motors have shrouds minimizing the possibility of accidental contact with the propellers.				

79998	Manual Tasks	Posture - sustained/awkward/static	During deployment on shore/surface: - awkward posture (kneeling, squatting, balancing etc) - bending/twisting - duration of work - load handling - long standing/sitting - muscular force exerted - repetitive movement	Unlikely	Moderate	Medium	
		Control	Hierarchy: Other Control: Take regular breaks, Keep area tidy, Position body (and maneuver boat) to life appropriately Use the handles on the equipment				
79999	Electrical	<50 volts AC/<120 volts DC	Fire or damage to batteries due to charging or discharging	Possible	Minor	Low	
		Control	Hierarchy: Administration Control: After being approved/checked by lab tech, operators can now keep batteries on their person and conduct charging in designated charging areas in s11.				
		Control	Hierarchy: Administration Control: Follow the operating manual for the chargers and ASVs				
		Control	Hierarchy: Engineering Control: Only use official supplier and tagged chargers.				
		Control	Hierarchy: PPE Control: Ensure batteries are charged and transported in lipo safe bags				
		Control	Hierarchy: PPE Control: Fire extinguisher and/or fire blanket at working site.				
80000	Other	General assembly, building and installation of sensors and payloads.	- injury due to misuse of tools - pinch points	Possible	Minor	Low	
		Control	Hierarchy: Administration Control: Standard operating procedures General assembly of the main hull and location of pinch points are clearly marked. An online SOP for the ASVs is maintained (QUT wiki). Each participant is aware and has access to these manuals and the latest is attached to this risk assessment.				
		Control	Hierarchy: Administration Control: Training and education Ensure each participant is appropriately trained for the tools and equipment they are using and if required inducted into the work-zone.				
80001	Fieldwork	Other	Public hazards Unauthorized persons approach the vessel during operation such as swimmers or canoes. - knocking someone into the water - collision with a swimmer - collision with another vessel - public interfering with the vessel	Rare	Minor	Negligible	
		Control	Hierarchy: Administration Control: Standard Operating Procedures Follow the SOP and exception permit requirements for notifying the public and locations for operation.				
		Control	Hierarchy: Engineering Control: The overall mass is to be kept low so that there is minimal kinetic energy in any collision. Ensure all motors are shrouded and the shrouds are intact.				
		Control	Hierarchy: Isolation Control: Remote control devices All vessels have at least one level of wireless estop of wireless e-Stops. For the BlueRov2, the first is a hardwired heartbeat which must be maintained from the shore to allow power to the motors. The other is the remote control unit (e.g., RC controller or tablet) which can manually override the computer and when switched off will also trigger the e-Stop.				

80001		Control	<p>Hierarchy: Isolation</p> <p>Control: The test location will be selected (moved within the site) to areas where there are no public visible or planned to be in the area. Conditions of applicable permits will be followed.</p> <p>If possible, on inland water storages, select sites that have no public access and seek approval from the land owners.</p>				
80003	Fieldwork	Other	<p>Working near water</p> <ul style="list-style-type: none"> - drowning - slipping and falling - cuts from debris in the mud (e.g. broken glass, sharp rocks) 	Unlikely	Major	Medium	
		Control	<p>Hierarchy: Administration</p> <p>Control: Prepare and train for emergency response Details of the trained first-aiders made aware to the team on arrival at site as well as the location (in-vehicle) of the emergency contacts and closest hospital.</p>				
		Control	<p>Hierarchy: Administration</p> <p>Control: Standard operating procedures</p> <p>The captain on boarding the boats will advise the team and crew of the standard operating procedures for all aspects of working at sea. This includes location of life-jackets, procedure for man overboard. These procedures are documented on-board the vessels and placards are placed around the vessel. For people that cannot swim or are uncomfortable around the water, they are encouraged to wear life-jackets whenever working near the edge of the boat.</p>				
		Control	<p>Hierarchy: Administration</p> <p>Control: WAM-V SOP - Initially, the boat will be assembled on the waters edge following a visual inspection of the area and assessment of water depth. With a bow rope attached, the boat will be carried until the the stern is in the water (approximately 5 inches deep) and then pushed from the bow until completely in the water. Recovery will involve remote controlling the boat to the shore bow first, dragging the boat back onto shore (lifting the bow slightly) until the rear handles are at the shoreline and then lifted onto shore. This means that only shallow water sites are needed</p>				
		Control	<p>Hierarchy: PPE</p> <p>Control: Each participant will wear enclosed footwear to allow walking at the water edge without risk of cutting feet due to debris and with enough grip to minimise slipping.</p>				
		Control	<p>Hierarchy: PPE</p> <p>Control: Ensure suitable and fit for purpose life-jackets are available for all personal. These must be worn whilst on the boats when required by the skippers and vessels operating procedures.</p>				
80004	Manual Tasks	Setting up equipment/furniture	Strains and sprains. Lifting equipment and transport cases for launching from shore.	Unlikely	Minor	Low	
		Control	<p>Hierarchy: Administration</p> <p>Control: Assess weight and size of load. Use more people to lift if awkward, slippery or unable to lift. Use trolleys on campus.</p>				
		Control	<p>Hierarchy: Other</p> <p>Control: General assembly of the main hull and location of pinch points are detailed in the manufacturers manual (see attachment). Each participant is aware and has access to this manual.</p>				
80005	Electrical	<50 volts AC/<120 volts DC	<p>General hazard: Working with ultra low voltage DC (5-24Volts) Electrical equipment such as electric motors and sensors.</p> <ul style="list-style-type: none"> - low voltage shock - burns - electrical fires 	Possible	Minor	Low	
		Control	<p>Hierarchy: Administration</p> <p>Control: Ensure all participants working with low-voltage electrical are trained in the use of the equipment and have the appropriate laboratory inductions if required to undertake the work.</p>				
		Control	<p>Hierarchy: Administration</p> <p>Control: Follow procedure for installation and removal of batteries. Ensure the equipment is turned off before installation or removal.</p>				

80005		Control	Hierachy: Administration Control: Keeping equipment and plant well maintained. Use only fit-for purpose equipment. Ensure all wiring is documented and appropriately labelled where necessary.				
		Control	Hierachy: Isolation Control: Isolation switches and/or quick release plugs/connectors (such as Anderson or XT connectors) for isolating power to the components being worked on.				
		Control	Hierachy: Other Control: Fire extinguisher and/or fire blanket at the work site. Also LiPo safe bags for transporting and charging LiPo batteries				
		Control	Hierachy: PPE Control: Ensure batteries are charged and transported in lipo safe bags				
80006	Other	Loss of robot during missions	- Losing contact with the robot during missions - Leaking of water into robot	Unlikely	Minor	Low	
		Control	Hierachy: Administration Control: Standard operating procedures The missions are planned such that the ROV will operate in within a defined range. The ROV are tethered and in loss of power the robot can be located and most likely retrieved using the tether. In the event of leaking of water into the ASV, the robot should have sufficient remaining buoyancy to remain at the surface In the event of a leaking robots, the batteries have been selected to minimize risk of fire or explosion and on recovery the robot will be isolated for up to 3 hours to ensure no fire risk before further handling.				
		Control	Hierachy: Administration Control: The Operation of the ROV in navigable waters are covered under the AMSA Specific Exemption permit. This has requirements in the equipment required such as radios for alerting people in the vicinity, markings and the use of a ground control station (tablets and/or computers).				
		Control	Hierachy: Other Control: The BlueRov have a hearthbeat sent over the teather. The operational status and approximate position are always known within a few meters.				
80008	Electrical	Operation of electrical equipment	Burn, Shock, Breathing in solder fumes	Possible	Minor	Low	
		Control	Hierachy: PPE Control: Ensure Glasses and extraction fan are used when soldering.				
		Control	Hierachy: PPE Control: When handling parts and chemicals ensure gloves are worn and safety gear including masks are worn.				
80178	Chemicals	Handling and use	*This chemical may not be used* Use of non-hazardous dichtol for waterproofing 3d parts. Standard handling risks include inhalation, skin contact, eye contact	Possible	Minor	Low	
		Control	Hierachy: Administration Control: The chemical will be stored in s9 store when not in use and be lent out when used in s11. To be returned at end of use				
		Control	Hierachy: Isolation Control: Remove risk by storing in carefully closed container upright with lid on tight				

80178		Control	<p>Hierachy: Other Control: General information In all cases of doubt, or when symptoms persist, seek medical advice. If unconscious but breathing normally, place in recovery position and seek medical advice.</p> <p>Following inhalation Remove casualty to fresh air and keep warm and at rest. In case of irregular breathing or respiratory arrest provide artificial respiration.</p> <p>Following skin contact Remove contaminated, saturated clothing immediately. After contact with skin, wash immediately with plenty of water and soap. Do not use solvents or thinners. Wash contaminated clothing before reuse.</p> <p>After eye contact Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical advice immediately.</p> <p>Following ingestion If swallowed, rinse mouth with water (only if the person is conscious). Seek medical advice immediately. Keep victim calm. Do NOT induce vomiting.</p> <p>Self-protection of the first aider First aider: Pay attention to self-protection! Most important symptoms and effects, both acute and delayed</p> <p>Symptoms In all cases of doubt, or when symptoms persist, seek medical advice. Indication of any immediate medical attention and special treatment needed First Aid, decontamination, treatment of symptoms.</p>				
		Control	<p>Hierachy: PPE Control: gloves, eye protection, respiratory protection</p>				
80320	Electrical	Design/modification	Water could enter electrical storage containers causing damage and potential shock. This is due to waterproof seals failing or not being sufficient	Possible	Moderate	Medium	
		Control	<p>Hierachy: Elimination Control: Try to use certified/standard waterproofed containers (BlueRov product) where possible and only use custom made containers where necessary</p>				
		Control	<p>Hierachy: Engineering Control: Ensure all waterproof containers are tested multiple times at the required depth before being used to store components.</p>				
83411	Electrical	Operation of electrical equipment	<p>Lipo Battery 5200mAh 14V -Overcharging- can cause damage and fires -Storage- Storing LiPo batteries in inappropriate temperatures or locations can affect their performance and safety -Thermal Runaway-A dangerous process where a battery overheats and cannot cool down, leading to fire, explosion, and toxic fumes -Physical Damage- Punctures, fractures, or tears in the battery casing can lead to internal short circuits, increasing the risk of fire</p>	Possible	Moderate	Medium	
		Control	<p>Hierachy: Administration Control: Ensure days notice before any use,s9 techs will prepare accordingly.</p>				
		Control	<p>Hierachy: Administration Control: For Handling, Lab Techs in s9 control the charging and storage of LIPOs.</p> <p>This is non-negotiable as the methods already in place for safe storage, charging and testing.</p>				
		Control	<p>Hierachy: Elimination Control: Check resistance between battery input terminals and ensure no shorts or low resistance before use to ensure max output is not placed on system.</p>				

83411		Control	Hierachy: Engineering Control: Before the battery is in operation ensure use in the system doesn't heat up the battery to a safety critical range. This is done through safe testing and calculations to ensure constant high draw causes heat				
		Control	Hierachy: Engineering Control: Don't run the battery down below 20% capacity.				
		Control	Hierachy: Isolation Control: Ensure when the battery is in use and/or exposed that there is a safe distance/exclusion zone. Especially for initial testing and research.				
		Control	Hierachy: Isolation Control: The LIPO will remain inside a LIPO Bag during transport at all times. Ensure it is collected like this.				

Participant Details:-

Participant Name
Scarlett Raine (sg.raine@qut.edu.au)
Josh Hecke (joshua.hecke@connect.qut.edu.au)
Tobias Fischer (tobias.fischer@qut.edu.au)

Reviewer Details:-

Reviewer Name	Review Status
Tobias Fischer (tobias.fischer@qut.edu.au)	Pending
Steven Bulmer (steven.bulmer@qut.edu.au)	Pending

Approver Details:-

Approver Name
Dhammika Jayalath (dhammika.jayalath@qut.edu.au)

Approval Details:-

ID	Approval	Approver Name	Approval Status
21769	Risk Assessment Endorsment required for Risk Assessment# 18339	Tobias Fischer (tobias.fischer@qut.edu.au)	Approved
22118	Risk Assessment Approval required for Assessment #18339	Firuz Zare (f.zare@qut.edu.au)	Cancelled
22165	Risk Assessment Endorsment required for Risk Assessment# 18339	Tobias Fischer (tobias.fischer@qut.edu.au)	Pending

Note Details:-

Subject	Note	Category	Created Date	Created By
Reviewer Note	<p>Hi Josh,</p> <p>Overall well done and comprehensive RA!</p> <p>- I've added Scarlett Raine as a participant as she's leading a lot of our marine robotics work, please update description accordingly. - Other team members need to contact operators + get induction - Remove everything boat related from the RA (loss of robot, ...), this is out of scope for this RA. If boat operation will happen in the future, we'll need to submit a separate RA. - Need to add water leakage as hazard + appropriate controls; describe tank etc. - Need to provide detailed information on where chemicals will be stored (Krishna to advise) - Need to provide detailed information on where batteries will be stored (Krishna to advise) - Change "low voltage" to "ultra low voltage" to be consistent with regulation</p> <p>Let me know if you have any questions.</p> <p>Best, Tobi</p>	Customer Notes	9/19/2025 10:29:17 AM	Tobias Fischer (tobias.fischer@qut.edu.au)

Reviewer Note	<p>Happy to accept this for now but maybe some additions would help further readings. Make it clear that the batteries used are not LIPO. I was sent a link to a Li-Ion battery which is a much safer chemistry. I would get Shaun and or S9 involved asap to get him in the loop for chemical purchase and storage. I think ultimately the users will be the ones requesting the chemicals for purchase and then involve S9 for the storage.</p>	Customer Notes	9/19/2025 10:29:17 AM	Steven Bulmer (steven.bulmer@qut.edu.au)
Endorser Note	<p>Hi Josh, I am happy to endorse this as soon as 1) Scarlett has been added to Project Description, and 2) You consider Steve's comments about chemicals/battery descriptions.</p> <p>Best, Tobi</p>	Customer Notes	9/19/2025 10:29:17 AM	Tobias Fischer (tobias.fischer@qut.edu.au)