



ARVP Hazard Analysis Form - 2023

Description:	Pool Tests	Completed By:	Abdalla, Jason, Logan & Nathan
Location:	Kinsmen Sports Centre	Date:	April 4th, 2023

Task	Existing/Potential Hazards	Hazard Classification	Risk			Method of Eliminating or Controlling	Mitigated Risk Level
			Likelihood	Consequence	Risk Level		
Driving to the location	<ul style="list-style-type: none"> - Car accident - Car breakdown - Unfavourable weather conditions 	- Physical	1	3	3	<ul style="list-style-type: none"> - Drivers discuss roadside conditions and practice defensive driving. - Vehicle maintenance is performed by the owners. - Only driving in favourable weather 	2
Moving the robot into the swimming pool	<ul style="list-style-type: none"> - Tripping and slipping - Lifting hazards 	- Physical	2	2	4	<ul style="list-style-type: none"> - Footwear and socks to be removed by members working near the swimming pool for better stability on wet surfaces and avoid injury. - Employing proper lifting form such as keeping one's back straight and lifting using legs. Utilize a two-person lift with one person on each side of the robot, with two swimmers ready to receive the robot in the swimming pool. 	1



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Swimming	- Drowning	- Biological	1	4	4	<ul style="list-style-type: none"> - Monitoring of swimmers. - Ensuring lifeguards are on duty. - Swimmers meet Red Cross level 5 skill level. 	2
- Competition task testing	<ul style="list-style-type: none"> - Unintended contact between the robot and the swimmers - Fingers getting caught in the robot's propellers 	- Physical	1	2	2	<ul style="list-style-type: none"> - Swimmers are briefed on handling and intended action of the robot beforehand. - Kill switch is easy to access and pulled immediately if the robot diverges from expected motion. - Designated member of the software team is describing order of robot actions to divers prior to tests. 	2



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<p>- Battery-related hazards</p>	<p>- Flammability</p> <p>- Off-gassing toxic gasses</p> <p>-Electricution due to improper handling</p> <p>- Accidental discharge during transportation</p>	<p>- Chemical</p> <p>- Physical</p>	<p>1</p>	<p>4</p>	<p>4</p>	<p>Following the ARVP's LiPo Battery Hazard Assessment Document:</p> <ul style="list-style-type: none"> - Monitoring cell voltage, ensuring batteries do not go below recommended state of charge. - Ensuring the surrounding area is clear of sharp objects to avoid punctures. - Monitoring the temperature of batteries - Discarding batteries that show signs of damage - Transporting batteries inside of LiPo Guard Safety bags - Storing the battery between 40% and 60% charge - Following SDS procedure for safe battery handling - Electrical components such as the battery are contained in a water-insulated compartment, and are only handled away from wet conditions 	<p>3</p>
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Pressure-related hazard due to temperature buildup inside the robot	- Venting of air towards robot handler	- Physical	2	1	2	- Turn off the robot if the temperature of the ORIN exceeds 80 °C. The system automatically turns off at the threshold temperature. - Open vent caps once the robot leaves the water.	1
Robot tether-related hazard	- Tripping - Electrical hazards	- Physical	2	2	4	- The tether is free from obstructions and placed away from the walkways. - Water-safe tether is used to relay commands to the robot - Clearance and tether management provided by members not moving the robot	2

Classification Guide:

Consequence:

1. Minimal (Little to no impact)
2. Minor (Minor injury or minor property damage)
3. Moderate (Serious injury or substantial property damage)
4. Severe (Permanent altering injury or severe property damage)

Likelihood:

1. Improbable (Not likely to happen)



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2. Remote (occurs rarely)
3. Occasional (happens occasionally)
4. Probable (happens or occurs frequently)

Risk Level: Consequence x Likelihood

Classification Types: Physical, Chemical, Ergonomic, Biological, or other that is appropriate for the hazard