

# Risk Register

**Location** The University of Adelaide - Fac of Eng, Comp & Math Sci -  
School of Mechanical Eng - \*N/A - \*N/A - \*N/A - \*N/A - Off  
Campus - 2099: Autonomous Quad Bike TASK

**Master Category** OHS

**Assessment Type** Tasks

**Assessment Checklist** Tasks - General

**Entity** The University of Adelaide

**School/Branch** School of Mechanical Eng

**Campus** \*N/A

**Room** \*N/A

**Risk Assessment Title** 2099: Autonomous Quad Bike TASK

**Faculty/Division** Fac of Eng, Comp & Math Sci

**Discipline/Unit** \*N/A

**Building** \*N/A

**Room Type** Off Campus

**Assessment Record:** 3227

**Assessment Checklist:** OHS - Tasks - General

| ID    | Hazard                                | Hazard Description/Nature of Risk  | How can this hazard/threat cause an incident/adverse event?  | Residual | Assessor                   |
|-------|---------------------------------------|--|--|----------|----------------------------|
| 15947 | Caught between moving machinery parts | Is there the potential for a person to be caught between moving parts of a machine? e.g. entrapment, pinch points, potential crush zones | There are several moving actuators on the quad bike (e.g. the brake actuator, gear selector) that are exposed. If a person were to place their hand on the actuator shaft as it were moving, there is potential for a finger to be pinched, or in the worst case crushed. The lid of the electronics box also acts as a pinch point. | Low (2)  | Rahul Emmanuel Kalampattel |

#### Risk Assessment Keywords

#### What controls are currently in place?

It is highly unlikely that a person will need to hold onto an actuator while it is operating. Even if they do hold onto it, all actuators on the vehicle move slowly enough such that there is sufficient time to remove a finger from being crushed. The lid will not be opened and closed during tests, and whenever it is closed it will be done in a slow and safe manner. To further reduce the likelihood of an incident, the operational area will be clearly marked and cordoned off during testing, with no one allowed in while the engine is running (except for starting or stopping the vehicle). In case of an incident, the remote emergency stop can be activated, and if this fails the emergency stop in place on the vehicle can be used.

| ID | Action Description | Control Statement | Responsible Person | Due Date | Cost | Progress | Control Type |
|----|--------------------|-------------------|--------------------|----------|------|----------|--------------|
|----|--------------------|-------------------|--------------------|----------|------|----------|--------------|

| ID    | Hazard                   | Hazard Description/Nature of Risk                               | How can this hazard/threat cause an incident/adverse event?   | Residual | Assessor                    |
|-------|--------------------------|---|---|----------|-----------------------------|
| 15948 | Caught on rotating parts | Is there potential for a person to be caught on rotating parts? | Several rotating components such as the steering motor belt drive, wheels and drive shaft may be exposed on the vehicle. In the event that a person makes contact with these parts while in motion, they could become caught. | Low (2)  | Rahul Emmanuel Kalam Pattel |

#### Risk Assessment Keywords

#### What controls are currently in place?

It is highly unlikely that a person will need to interact with rotating parts of the vehicle while they are in operation. In addition, the steering motor belt drive will be covered by a Perspex guard when in operation. To further reduce the likelihood of an incident, the operational area will be clearly marked and cordoned off during testing, with no one allowed in while the engine is running (except for starting or stopping the vehicle). In case of an incident, the remote emergency stop can be activated, and if this fails the emergency stop in place on the vehicle can be used.

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|----|--------------------|-------------------|--------------------|----------|------|----------|--------------|
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|--------------------------|--------------------------------------|--|---|----------|----------------------------|
| 15949                    | Contact with chemicals, fumes or gas | Is there the potential for a person to come into contact with chemicals or gas? e.g. fumes from chemicals, dry ice, machine oils, Liquid N2  | When running the vehicle, it is likely that exhaust fumes will be present, which may be hazardous if exposure is prolonged. | Low (2)  | Rahul Emmanuel Kalampattel |
| Risk Assessment Keywords |                                      | What controls are currently in place?<br><br>The vehicle will be operated outdoors, meaning that there will be adequate ventilation. In the event that there are excessive fumes and natural ventilation is not adequate, suitable PPE will be worn. |   |          |                            |

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| ID    | Hazard   | Hazard Description/Nature of Risk  | How can this hazard/threat cause an incident/adverse event?   | Residual    | Assessor                   |
|-------|--|--|---|-------------|----------------------------|
| 15950 | Contact with electricity or potential for electric shock | Is there the potential for a person to come into contact with live electricity or receive an electric shock? e.g. Overhead or underground power lines, exposed wires, water near equipment, leads/switch in poor condition | Various electronic components are present on the vehicle, including a microcontroller, actuators and sensors. The majority of these are powered by the vehicle's battery. If a person were to make contact with a part of circuit that was live, or touch the battery itself, they could receive an electric shock. | Medium (20) | Rahul Emmanuel Kalampattel |

#### Risk Assessment Keywords

#### What controls are currently in place?

It is unlikely than a person will need to interact with electronics while powered. All wires are shielded, and the components that present the greatest hazard are stored within the electronics box, thus making it difficult to accidentally touch them. The vehicle's battery is located underneath the electronics box, also making it difficult to reach. Prior to operation, all cables and sensors will be checked for damage. To further reduce the likelihood of an incident, the operational area will be clearly marked and cordoned off during testing, with no one allowed in while the engine is running (except for starting or stopping the vehicle). In case of an incident, the remote emergency stop can be activated, and if this fails the emergency stop in place on the vehicle can be used.

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| ID    | Hazard                                   | Hazard Description/Nature of Risk  | How can this hazard/threat cause an incident/adverse event?   | Residual    | Assessor                   |
|-------|--|--|---|-------------|----------------------------|
| 15951 | Contact with hot object or friction burn | Is there the potential for a person to come into contact with an object which is hotter than 50 degrees Celsius? e.g. steam, naked flame, laser beams, heating block | Some parts of the vehicle will become hotter over the course of testing, e.g. the exhaust and engine block. Contact (either direct or indirect in the case of exhaust gases) with such parts could lead to burns. | Medium (12) | Rahul Emmanuel Kalampattel |

#### Risk Assessment Keywords

#### What controls are currently in place?

It is highly unlikely than a person will need to interact with heated parts of the vehicle while they are in operation. If parts such as the exhaust do need to be inspected, care will be taken to allow parts to cool down before touching them, or gloves will be worn. To further reduce the likelihood of an incident, the operational area will be clearly marked and cordoned off during testing, with no one allowed in while the engine is running (except for starting or stopping the vehicle). In case of an incident, the remote emergency stop can be activated, and if this fails the emergency stop in place on the vehicle can be used.

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|-------|-------------------------------|---|---|----------|----------------------------|
| 15952 | Entangled on moving machinery | Is there the potential for a person to be entangled on moving parts of a machine? e.g. hair, jewellery, clothing, cleaning aids, gloves | Parts of the vehicle that rotate during operation provide potential entanglement hazards if the operator has long hair, loose fitting clothing, loose jewellery, gloves, etc. | Low (2)  | Rahul Emmanuel Kalampattel |

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|----|--------------------|-------------------|--------------------|----------|------|----------|--------------|
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|--------------------------|-------------------|--|---|----------|----------------------------|
| 15953                    | Exposure to noise | Is there the potential for a person to be exposed to noise? e.g. exceed an 8 hour noise equivalent of 85dB(A) or peak noise levels of more than 140dB(C)   | It is possible that the vehicle is loud when in operation, and the noise may be harmful if exposure is prolonged. | Low (2)  | Rahul Emmanuel Kalampattel |
| Risk Assessment Keywords |                   | <p><b>What controls are currently in place?</b></p> <p>The noise indicator present in the labs will flash red if the noise level is above 85 dB(A). If this is the case, hearing protection will be worn. If the sound level is measured to be below this level, hearing protection will only be worn as appropriate (e.g. close work over a prolonged period of time). Since the vehicle will be operated outdoors, it is anticipated that protection will not be required.</p> |   |          |                            |

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| ID    | Hazard                             | Hazard Description/Nature of Risk   | How can this hazard/threat cause an incident/adverse event?   | Residual | Assessor                   |
|-------|------------------------------------|---|---|----------|----------------------------|
| 15954 | Exposure to non-ionising radiation | Is there potential for a person to be exposed to non-ionising radiation? e.g. RF Transmissions, working outdoors, UV transilluminator, laser beam, static magnetic fields | The ground penetrating radar (GPR) system emits radio waves from 800 MHz to 2 GHz, depending on the antenna head selected. Similarly, the metal detector panel produces an electromagnetic field (1 - 40 kHz). If either sensor were to be held close to a person for a prolonged period of time, they might be exposed to harmful levels of radiation. | Low (1)  | Rahul Emmanuel Kalampattel |

#### Risk Assessment Keywords

#### What controls are currently in place?

The low power density of the GPR and metal detector systems means that the emissions will not be hazardous under normal operation. Since the sensors are to be mounted to the vehicle, there is no risk of close proximity radiation exposure.

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|--------------------------|-------------------|---|--|-------------|----------------------------|
| 15955                    | Struck by vehicle | Is there the potential for a person to be struck by a vehicle? e.g. a car, a truck, a tug, a forklift   | The vehicle will be tested autonomously, and in the event that it loses control, it could potentially collide with a person. | Medium (10) | Rahul Emmanuel Kalampattel |
| Risk Assessment Keywords |                   | <p><b>What controls are currently in place?</b></p> <p>Since the vehicle will be operated at low speeds (speed is limited to 5 km/h) it is unlikely that a collision will occur, or if it does, is unlikely to be of great consequence. To further reduce the likelihood of an incident, the operational area will be clearly marked and cordoned off during testing, with no one allowed in while the engine is running (except for starting or stopping the vehicle). In case of an incident, the remote emergency stop can be activated, and if this fails the emergency stop in place on the vehicle can be used.</p> |  |             |                            |

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