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Health and Safety Risk Assessment

Activity / Task / Location:	Reviewed / Approved By: Andrew Fleming
ELEC4840A - Sound-source Localisation using a Microphone-array for NUbots	Signature and Date:
Risk Assessment Developed by: Clayton Carlon	**Date:** 12/03/2023

Risk Matrix

N.B. For more details regarding use of this matrix / definitions refer to final page of this document

Consequence \ Likelihood	Rare	Unlikely	Possible	Likely	Almost Certain
Severe *Eg. Potential Fatality or Injury or Illness with permanent disability*	MEDIUM	MEDIUM	HIGH	EXTREME	EXTREME
Major *Eg. Potential Lost Time Injury (but non-permanent disability)*	LOW	MEDIUM	MEDIUM	HIGH	EXTREME
Moderate *Eg. Potential Medical Treatment injury or illness (but no lost time)*	LOW	LOW	MEDIUM	MEDIUM	HIGH
Minor *Eg. Potential First Aid injury*	LOW	LOW	LOW	MEDIUM	MEDIUM
Minimal *Eg. Hazard or near miss requiring reporting and follow up action*	LOW	LOW	LOW	LOW	LOW

Actions required based on Risk Assessment

Extreme	An "extreme" risk requires immediate assessment and senior staff consideration is required; a detailed mitigation plan must be developed, and consideration should be given to ceasing the activity unless the risk can be reduced to a level of high or less; regular monitoring and reported on to the relevant management/steering committee; Target resolution should be within 1 month.
High	A "high" risk may also require immediate assessment and senior staff consideration; a mitigation plan must be developed; regular monitoring and reported on to the relevant management/steering committee. Target resolution (ideally reduction to medium or low level of risk) should be within 3 months.
Medium	A mitigation plan must be developed; existing controls need to be reviewed. Target resolution (ideally reduction to low level of risk) should be within 1 year.
Low	Risk is tolerable; manage by well established, routine processes/procedures and be mindful of changes to nature of risks.

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Hazard Identification and initial Risk Rating			Control measures and Residual Risk Rating		Remaining Hazards	Actions required
What are the steps of the activity / items of equipment?	What are the potential hazards?	Risk Rating based on Risk Matrix	What control methods or measures will be used to reduce the likelihood and/or the consequence of an illness or injury from those hazards?	Residual Risk Rating based on Risk Matrix	What hazard remains?	What additional actions are required (by who and in what timeframe) to raise the level of control?
Soldering iron for assembling hardware	Minor Burns	Low	Hold iron correctly; keep hands away from tip when applying solder or handling the component.	Low	None	None
	Lead Poisoning	Medium	Wash hands after soldering; use extraction fan for fumes.	Low	None	None
	Splatter in eyes	Medium	Wear safety-glasses.	Low	None	None
DC power-supply	Electric Shock	Medium	Do the lab-induction for students and seek supervision by lab-demonstrators; avoid touching live contacts and shorting the supply.	Low	None	None
LiPo battery for the NUbots robots in final	Fire, toxic fumes	Medium	Use external power instead; if a battery must be used,	Low	The battery may still catch	Always store and charge the battery

testing			then use the battery-monitor with supervision in the NUbots lab.		on fire but much less likely.	in the correct facility in the NUbots lab with supervision from other NUbots members.
NUbots robots for final testing	Pinching and crushing from actuated limbs	Medium	Keep hands away from joints of the robots when active; use harness to handle them.	Low	None	None
Noise from sound-generation for testing	Hearing damage	Low	Do not generate sound either for long periods or at high intensities, thus mitigating exposure; avoid tones with high frequencies; if this cannot be done, then wear ear-protection.	Low	None	Warn people in surrounding around of noise.
Ergonomics when working on computers	Back-pain, neck-pain, eyestrain	Medium	Sit upright with the screen at eye-level; take breaks and stretches every hour.	Low	None	None

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Summary of Requirements based on Risk Assessment		Review Period / Date
Personal Protective Equipment	Safety-glasses, ear-protection	
Other Equipment and Equipment Protection	RCD for power supply	
Training Requirements	EE lab-induction and general access	
Procedures, SOPs etc	Discipline of Electrical Engineering Safety Manual 2022, SOP for soldering iron, MSDS for 362 Rosin Activated Flux - Tin/Lead,	
Relevant Legislation etc.	WHS Act 2011 (NSW) & Regulations / Codes of Practice	

Questions to ask in order to determine the hazards relating to the task:

A Could people be injured or made sick by things such as:

- Noise
- Light
- Radiation
- Toxicity
- Infection
- High or low temperatures
- Electricity
- Moving or falling things (or people)
- Flammable or explosive materials
- Things under tension or pressure (compressed gas or liquid; springs)
- Any other energy sources or stresses
- Biohazardous material
- Laser

B Can workplace practices cause injury or sickness?

- Are there heavy or awkward lifting jobs?

D What could go wrong?

- What if equipment is misused?
- What might people do that they shouldn't
- How could someone be killed?
- How could people be injured?
- What may make people ill?
- Are there any special emergency procedures required?

E Are procedures or organisational systems missing or not being followed?

- Standard Operating Procedures?
- Risk Assessments?
- Induction or training?
- Management of change?
- Safety Inspections?
- Hazard reporting?
- Contractor Management?

F What kinds of injuries could possibly occur?

- Broken bones

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• Can people work in a comfortable posture? • If the work is repetitive, can people take breaks? • Are people properly trained? • Do people follow correct work practices? • Are there adequate facilities for the work being performed? • Are universal safety precautions for biohazards followed? • Is there poor housekeeping? Look out for clutter • Torn or slippery flooring • Sharp objects sticking out • Obstacles	• Eye damage • Hearing problems • Strains or sprains • Cuts or abrasions • Bruises • Burns • Lung problems including inhalation injury/ infection • Skin contact • Poisoning • Needle-stick injury • Psychological illness or injury
C Imagine that a child was to enter your work area? • What would you warn them to be extra careful of? • What would do to reduce the harm to them?	

How to Assess Risk

Step 1 – Consider the Consequences

What are the potential consequences of an incident occurring?
Consider what could reasonably happen as well as what may actually happen.

Look at the descriptions and choose the most suitable Consequence.

Consequence	
Serious	Potential Fatality or Injury or Illness with permanent disability
Major	Potential Lost Time Injury requiring time off work (but non-permanent disability)
Moderate	Potential medical treatment Injury or Illness but no lost time
Minor	Potential First Aid Injury
Minimal	No injury but hazard exists or near miss occurred requiring reporting and follow up action

Step 2 – Consider the Likelihood

What is the likelihood of the consequence identified in step 1 happening?

Consider this with the current controls in place.

Look at the descriptions and choose the most suitable Likelihood.

Likelihood	
Almost Certain	The event could be expected to occur in most circumstances: "This is a common problem here".
Likely	The event has a reasonable chance of occurring in usual conditions: "It has happened here before".
Possible	The event might occur occasionally, has occurred sometime: "Has infrequently happened here before".
Unlikely	The event has a small chance of occurring. "It has not happened here but has occurred elsewhere".
Rare	Very unlikely to occur. "It would be extremely rare for it to occur here".

Step 3 – Calculate the Risk Rating

A. Take Step 1 rating and select the correct column.

B. Take Step 2 Rating and select the correct line.

C. The calculated risk rating is where the two ratings cross

CONSEQUENCE	LIKELIHOOD: Rare	Unlikely	Possibly	Likely	Almost Certain
Serious	MEDIUM	MEDIUM	HIGH	EXTREME	EXTREME
Major	LOW	MEDIUM	MEDIUM	HIGH	EXTREME
Moderate	LOW	LOW	MEDIUM	MEDIUM	HIGH
Minor	LOW	LOW	LOW	MEDIUM	MEDIUM
Minimal	LOW	LOW	LOW	LOW	LOW

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Health and Safety Risk Assessment

Controlling the Risk: Risk control is a method of managing the risk with the primary emphasis on controlling the hazards at source. For a risk that is assessed as "extreme" or "high", steps should be taken immediately to minimize risk of injury. The method of ensuring that risks are controlled effectively is by using the "hierarchy of controls". The Hierarchy of Controls are:

Control Type	Example
Eliminate	Removing the hazard, eg taking a hazardous piece of equipment out of service.
Substitute	Replacing a hazardous substance or process with a less hazardous one, eg substituting a hazardous substance with a non-hazardous substance.
Engineering	Redesign a process or piece of equipment to make it less hazardous, Isolating the hazard from the person at risk, eg using a guard or barrier, or containing the hazard in an enclosure.
Administrative	Adopting safe work practices or providing appropriate training, instruction or information.
Personal Protective Equipment (PPE)	The use of personal protective equipment could include using gloves, glasses, earmuffs, aprons, safety footwear, dust masks. **NOTE: This is a last resort control and should be used in conjunction with higher level controls.**

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