UNIVERSITY OF LIVERPOOL

SINLGE USER BEng, MEng, MSc GROUP PROJECT RISK ASSESSMENT FORM - REPORT ONLY SIGNIFICANT HAZARDS

Unsafe working methods will lead to a reduction in your final project mark! ALL hardware work must be completed within the laboratory

Students are encouraged to come on site to perform their lab work but are advised that in some circumstances (Adriano, raspberry Pi and micro-controller boards which operate at <20V) equipment is allowed to be brought home. Students removing any other equipment from the lab needs to be authorised in writing by your supervisor - supervisors please confirm with HOD/safety team to confirm.

NAME- Jiajun Guo Student ID Number- 201676348	LOCATION- Final year Laboratory
SCHOOL/DEPARTMENT: Electrical Engineering & Electronics Undergraduate year of study: Year 3	BUILDING: Electrical Engineering and Electronics, A-Block
TITLE OF PROJECT: Smart Sock - Project in partnership with Aintree Hospital	
Description of Work: Develop socks with sensors to monitor frail/elderly heart failure (HF) patients for the development of ankle swelling.	

Select a category for this project: Category 1	**Category 1 – Projects based on specialist equipment:** Projects requiring equipment available in the electronics laboratories (such as power supplies, multimeters, oscilloscopes, etc.) or any other specialist equipment that requires specific health and safety considerations (such as drones, etc.) that students would not normally be allowed to take home.
	Category 2 – Projects based on "home-friendly" equipment: Projects requiring small pieces of equipment that do not require specific health and safety considerations and students can safely use at home (Raspberry Pi's, Arduinos and other similar low-voltage boards with double insulated power supplies).
	Category 3 – Projects based on software only: Projects fully based on software that can be completed using only a computer, without requiring any other equipment.

If students are in an observation capacity only when experiment is being performed

- please state this on form as well as risk in being observers - i.e. possible distracting experimentalist,
- State risk if they could be injured in this respect and how. Significant risks only should be stated.
- Class of any laser is required

State voltage & current values of all power sources being used. Any power supplies that have the ability to generate current and voltages > 10mA AND >20V respectively can be regarded as potentially extremely hazardous:

Voltage 5V Current 2A

HAZARDS (Location, equipment and substances, activities)	WHO CAN BE HARMED?	CURRENT CONTROLS	Likelihood (L) × Consequence (C) = RISK SCORE (R)		
			L	C	R
Power sources in the laboratory, electrical systems working live, etc., can cause injuries such as electric shocks, fires, and explosions.	People in areas where a fire or explosion may occur in the laboratory.	Note the low voltage (< 5V). Before using laboratory instruments, check the equipment for damage or failure, and follow the equipment manufacturer's safety recommendations during use to avoid potential risks. Turn off the power after use and store as required.	1	5	5
Injuries caused by soldering, including toxic gases that may be generated during use.	Personnel in the soldering work area.	Use the accompanying tools, follow the correct steps, and use the extractor fan to remove the smoke from the soldering process.	1	3	3
Slips and falls	With anyone nearby	Always keep the workbench clean and tidy, and place wires and personal items properly. Pay attention to the surrounding environment to avoid collisions with other workers around.	2	1	2
Lithium batteries can cause fires or explosions.	Worker	Use lithium batteries with product qualification certificates, production processes in line with quality control requirements, and design safety in line with relevant safety specifications. A detailed laboratory test of the battery is required before the experiment to assess its safety. In addition, ensure that the storage temperature of the battery is between -5 ° C and 35 ° C to use the battery in the right environment to ensure that it has a good safety record and meets all safety regulations.	1	4	4
Muscle damage from working long hours.	Worker	After working for a period, take a moderate rest, such as moving the wrist and cervical spine, to avoid excessive fatigue.	3	1	3
The hazards of display screens on the eyes.	Worker	Avoid looking at the screen for too long. For example, protective glasses such as those that block blue light can be used to reduce the harm of the display screen to the eyes.	4	1	4

- **For work using only Raspberry Pi and/or Arduino boards or other hardware connected via USB cable the main hazards are Display Screen Equipment (DSE) related, e.g. Repetitive Strain Injury, Carpal Tunnel Syndrome. L=1, C=1, R=1**

Training table - All boxes must be ticked in the following section to indicate either YES or NO.			
	NO	YES	If you have ticked YES please follow the hyperlinks in the attached document, complete and return supplementary paperwork and/or implement and adhere to the guidance given.
Use of tenon saw/hacksaw	✓		**Read Safe Operating** Procedure and other documentation on hand tools
Will work require the lifting of weights (>15kg)	✓		Manual Handling
Laser – If yes please input class of laser. Laser documents and hazard should be described on page 2 if laser is **NOT** class 1	✓		Please read all documents in the following link README : Laser: information and registration Guidance on the Safe Use of Lasers in Education & Research

Use of drones	✓		Prior to the purchase of any drone equipment, please consult the safety team – even if the devices purchased are not intended to be flown. Please refer to drones
Use gas cylinders or compressed gas?	✓		Gas Cylinder safety : Email local safety team to verify if training is required
Use hazardous Chemicals only? If stated on the form, description of hazard is required.	✓		COSHH - Use on-line EEE COSHH system to create COSHH risk assessment. Email local safety team to verify if training is required
Use voltages over 30V DC/AC If hazard has been previously described this	✓		Electrical Safety/Electricity – Includes reading the Sch. of EEE & CS dangers of electricity document
Use Power tools or rotating motors and machines	✓		SCR15-4 PUWER
Use Cryogenic Liquids/gases	✓		Cryogenic liquids and solids – Email local safety team to verify if training is required
Use Vacuum Systems and pressurised vessels	✓		Pressure systems : Email local safety team to verify if training is required
Use Radiation (UV, x-rays, microwaves)	✓		UV radiation (including links to local rules & safety advisor website)

LEVEL of Supervision? C	A = Work May not be started without direct supervision
	B = Work may not start without Supervisor advice or approval
	C = No specific extra supervision requirements

Other relevant specific assessments (Local rules, Ethic approval forms)- Ethic approval forms

Disclaimer

- *The University of Liverpool ensures as far as is reasonably practical the health and safety of its staff and students.*
- *All equipment used by the students for their project must be safety tested and approved by the laboratory technicians before use. This includes but is not limited to, soldering irons, oscilloscopes, power supplies, probes and multimeters.*
- *Students MUST NOT undertake hazardous experimental/development work associated with their project outside of their designated laboratory space.*
- *ALL equipment that is used in the laboratory space & project MUST be purchased through the departments purchasing procedures.*
- *No equipment to be plugged into the mains supply unless circuit has been approved by technician or supervisor.*
- *Failure to abide by these conditions can result in the project receiving 0%.*
- ***Submission of this form implies acknowledgement by all the students named below.***

I can confirm that Hazards identified and precautions specified are appropriate for the task :-

Acknowledgement by Student 1 Name.....Jiajun Guo.....Signature.....Jiajun Guo.....Date.....5, October, 2023

Academic supervisor Name.....Ian Sandall..... Signature.....Date.....

Common reasons for previously rejection of the form

- Project category was not stated on the assessment.
- Contradiction of hazards listed on page 2 compared those identified in training table. Users inserted description of hazards such as chemicals & live working but failed to insert yes in hazard table. Only hazardous chemicals should be described. Only significant hazards observed in experimental process should be described.

- Missing supervisor signature – risk assessment is invalid & students cannot enter the laboratory area
- Additional hazards noted in training table that are not described in hazard section. Lasers were described in training table required but hazard was not described in main assessment. Laser users should refer to risk assessment template document to identify how these should be described.

GUIDANCE TO COMPLETE THIS RISK ASSESSMENT FORM (LIKELIHOOD / CONSEQUENCE / RISK SCORE)

Likelihood			Consequence			Risk score	ACTION TO BE TAKEN
1	Very unlikely		1	Insignificant – no injury		1-2 NO ACTION	No action required but ensure controls are maintained and reviewed.
2	Unlikely		2	Minor – minor injuries needing first aid		3-9 MONITOR	Look to improve at next review of if there is a significant change
3	Fairly likely		3	Moderate – up to seven days absence		8-12 ACTION	Reduce risk if possible, within specified timescale
4	Likely		4	Major – more than seven days absence; major injury		15-25 STOP	Stop activity and immediate action
5	Very likely		5	Catastrophic – death; multiple serious injury			

- For work using only Raspberry Pi and/or Arduino boards (i.e. no other hardware connected using additional power supplies) the only hazards are Display Screen Equipment (DSE) related, e.g. Repetitive Strain Injury, Carpal Tunnel Syndrome. L=1, C=1, R=1