Mobile Robotics Laboratory

Identification of risks and preventive measures

This document includes the main risk-generating laboratory activities that have been reported to the Occupational Risk Prevention Service of UPC. For each activity, the risk involved and the preventive measures to be applied are indicated. This information must be provided by the person in charge of the activity to people who may be exposed to the risks that they generate.

To communicate other activities of the laboratory, inform through the person in charge of the activity.

The individual protection equipment indicated must be provided by the person in charge of the activity in accordance with the procedure for the management of individual protection equipment https://www.upc.edu/prevencio/ca/seguretat-higiene/epi

For information on the prevention of occupational hazards indicated, access the PRL website https://www.upc.edu/prevencio/ca/informacio-en-prl

This information is structured in:

1. Laboratory description
2. General safety and hygiene regulations in laboratories
3. Identification of risks and preventive measures
4. Order, Cleaning and Maintenance
LABORATORY DESCRIPTION

Laboratory: Mobile Robotics Laboratory
Bàsic Unit: IRI. Institut de Robòtica i Informàtica Industrial

Situation:

Campus: South  Centre: FME
Building: U  Floor: 0  Door: 021

Campus: North  Centre: Outdoor area
Building: A5-A6-C5-C6  Floor: 0  Door:

Activities:

OPERATIONS WITH ROBOTS
WELDING OPERATIONS
OPERATIONS WITH PORTABLE ELECTRICAL MACHINERY
TRANSPORT AND/OR MANUAL HANDLING OF LOADS
USE OF LOAD-LIFTING EQUIPMENT: HAND PALLET TRUCKS
USE OF MANUAL CUTTING TOOLS AND UTENSILS
USE OF MANUAL TOOLS
ACCESSING AND/OR MOVING AROUND THE WORK AREA
USE OF PORTABLE LADDERS
TASKS USING VISUAL DISPLAY UNITS
Laboratory: Mobile Robotics Laboratory

Bàsic Unit: IRI. Institut de Robòtica i Informàtica Industrial

Situation:

Campus: North
Building: A5-A6-C5-C6

Centre: Outdoor area
Floor: 0

Door:
SAFETY AND HYGIENE REGULATIONS

General Safety and Hygiene Regulations for Laboratories

WORK HABITS AND PERSONAL HYGIENE

- Keep your workplace clean and free from objects. Do not leave personal objects on work surfaces.
- Familiarise yourself with the location of emergency exits and evacuation routes, fire extinguishers, and first aid equipment in your laboratory.
- Find out what to do in the case of an emergency. Keep the aisles free from objects.
- Do not work alone in the laboratory. If you have no option but to work alone, make sure the control centre knows that you are in the laboratory.
- Do not wear contact lenses. They can cause eye injuries if they are splashed or particles enter the eye.
- Tie your hair back. Do not wear pendants, bracelets or wide sleeved clothing, etc. They can cause injuries if they get caught in equipment or due to electric shock, etc.
- Do not wear shorts, short skirts, sandals, open-toe shoes, etc., that is, do not wear clothing that exposes skin to prevent injuries due to splashing, flying particles and/or falling objects.
- Do not eat or drink in the laboratory.
- Wash your hands after handling materials and before leaving the laboratory.

SAFETY SIGNS

- Read and follow the safety signs in your workplace. They inform you of specific hazards, obligations, prohibitions and emergencies.

- Make sure that safety signs are always visible and in good condition. Do not cover them or change their position.
- If you do not know, ask what a safety sign means before you act.
SAFETY AND HYGIENE REGULATIONS

General Safety and Hygiene Regulations for Laboratories

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Find out which PPE should be used in the laboratory before you carry out an activity or practical.
- Only use PPE that has CE marking.
- Read the product information booklet carefully before you use the PPE.
- Check the condition of the PPE before you use it. Withdraw any PPE that is faulty, flawed or damaged.
- Keep PPE in good condition. Store in a designated place.

WORK EQUIPMENT

- Do not use work equipment until you know how it operates, the relevant safety regulations, and how to act in case of an emergency.
- Visually inspect the condition of the work equipment and electrical components before use.
- Use independent plug sockets to connect each piece of equipment. Do not use extension sockets. Do not connect cables with electrical tape.
- Disconnect all work equipment safely at the end of the activity.

- Do not use work equipment connected to the electricity supply if it is wet or if you have wet hands.
- If you see any anomaly in the work equipment, disconnect it from the electricity supply and label it as faulty so that it is no longer used.

Revise your work habits to enhance your safety

For further information see: http://www.upc.edu/prevencio/ca/seguretat-higiene
OPERATIONS WITH ROBOTS

RISK(S): Knocks and contact with moving objects
Trapping by or between objects

HEALTH AND SAFETY MEASURES:

* Collective protection equipment (CPE):

<table>
<thead>
<tr>
<th>Type</th>
<th>CPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety devices</td>
<td>Delimiters of operating areas</td>
</tr>
<tr>
<td>Safety devices</td>
<td>Safety switches and commands</td>
</tr>
</tbody>
</table>

* Technical/organisational measures (TOM):

- Only undertake checking, measuring or adjustment operations, among others, when the work equipment has stopped and is disconnected from any power source.
- In the case of an incident, use the emergency stop device, which will halt the work equipment in a shorter time than a normal shutdown.
- Do not inactivate safety devices or remove protective elements or guards from the work equipment.
- Periodically check that the work equipment's electrical circuit is connected to ground, including the metal parts.
- Periodically check that all of the safety devices are working correctly.
- Before the robot's movement is started, check that there are no objects in its field of movement that could cause a collision.
- Control the working speed of the robot.
WELDING OPERATIONS

**RISK/S:** Exposure to harmful and/or toxic substances
Thermal contact

**HEALTH AND SAFETY MEASURES:**

* Collective protection equipment (CPE):

<table>
<thead>
<tr>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>Local extraction system</td>
<td>Table-top extractor</td>
</tr>
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</table>

* Personal protection equipment (PPE): [http://www.upc.edu/prevencio/ca/epi](http://www.upc.edu/prevencio/ca/epi)

<table>
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<th>Part of the body to protect</th>
<th>PPE</th>
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<tbody>
<tr>
<td>Protection of the eyes / face</td>
<td>UPC101 - Safety goggles : For use if you wear prescription glasses</td>
<td>[link to the catalogue]</td>
</tr>
<tr>
<td>Protection of the eyes / face</td>
<td>UPC102 - Safety glasses</td>
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<tbody>
<tr>
<td>Health and safety regulations</td>
<td>SHR 218 - Soldering</td>
<td>[link to the PDF]</td>
</tr>
</tbody>
</table>
OPERATIONS WITH PORTABLE ELECTRICAL MACHINERY

RISK/S:  Knocks/cuts by objects or tools
Projection of fragments or particles

HEALTH AND SAFETY MEASURES:

* Personal protection equipment (PPE):  

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<td>Protection of hands / arms</td>
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<td>UPC102 - Safety glasses</td>
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<tr>
<td>Protection of the respiratory tract</td>
<td>UPC202 - Respiratory protection mask</td>
<td>[link to the catalogue]</td>
</tr>
<tr>
<td>Protection of the ears</td>
<td>UPC301 - Ear plugs with headband</td>
<td>[link to the catalogue]</td>
</tr>
</tbody>
</table>

* Technical/organisational measures (TOM):

- Check that the voltage indicated on the equipment's identification plate is the same as that of the electric distribution network to which it is connected.
- Keep hands away from the cutting tool. Place hands on the equipment's controls while workpieces are being machined.
- Use clamps, screws or other securing devices to secure the work piece.
- Only undertake checking, measuring or adjustment operations, among others, when the work equipment has stopped and is disconnected from any power source.
- Periodically check that all of the safety devices are working correctly.

* Health and safety information:  

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<tr>
<td>Health and safety regulations</td>
<td>SHR 208 - Angle grinders</td>
<td>[link to the PDF]</td>
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<tr>
<td>Health and safety regulations</td>
<td>SHR 209 - Portable electric drills</td>
<td>[link to the PDF]</td>
</tr>
<tr>
<td>Health and safety regulations</td>
<td>SHR 210 - Portable electric jigsaws</td>
<td>[link to the PDF]</td>
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</tbody>
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TRANSPORT AND/OR MANUAL HANDLING OF LOADS

RISK/S: Failing of objects due to handling
Knocks/cuts by objects or tools

HEALTH AND SAFETY MEASURES:

* Personal protection equipment (PPE): http://www.upc.edu/prevencio/ca/epi

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<tr>
<td>Protection of feet / legs</td>
<td>UPC601 - Safety footwear</td>
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* Health and safety information: http://www.upc.edu/prevencio/ca/informacio-en-prl

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<td>Ergonomic recommendations</td>
<td>ER 001/01 - Introduction to the manual handling of loads</td>
<td>[link to the PDF]</td>
</tr>
<tr>
<td>Ergonomic recommendations</td>
<td>ER 001/02 - Techniques for manual handling of loads</td>
<td>[link to the PDF]</td>
</tr>
<tr>
<td>Ergonomic recommendations</td>
<td>ER 001/03 - Manual handling of special loads</td>
<td>[link to the PDF]</td>
</tr>
</tbody>
</table>
USE OF LOAD-LIFTING EQUIPMENT: HAND PALLET TRUCKS

**RISK/S:** Falling of objects due to handling
Overexertion

**HEALTH AND SAFETY MEASURES:**

* Personal protection equipment (PPE): [link to the catalogue]

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* Health and safety information: [link to the PDF]

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<td>Health and safety regulations</td>
<td>SHR 212 - Hand pallet trucks</td>
<td>[link to the PDF]</td>
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USE OF MANUAL CUTTING TOOLS AND UTENSILS (CUTTER, SHEARS, CUTTING PLIERS)

RISK/S: Knocks/cuts by objects or tools

HEALTH AND SAFETY MEASURES:

* Personal protection equipment (PPE):

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* Technical/organisational measures (TOM):

- Keep the tip of the tool away from your body and from other people.
- Put a protective guard or cover over pointed tools or tools with sharp edges.
- Store tools and accessories in a cupboard or suitable place (tool holder panel or tool box).
- Regularly maintain tools.
USE OF MANUAL TOOLS

RISK/S:  Knocks/cuts by objects or tools
         Projection of fragments or particles

HEALTH AND SAFETY MEASURES:

* Personal protection equipment (PPE):
  http://www.upc.edu/prevencio/ca/epi

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* Technical/organisational measures (TOM):
  - Store tools and accessories in a cupboard or suitable place (tool holder panel or tool box).
  - Regularly maintain tools.
  - Select the right tool before starting the task.
  - Do not overload the capacity of a hand tool by using extensions or hitting with a hammer.
ACCESSING AND/OR MOVING AROUND THE WORK AREA

RISK(S): Falling of people to the same level
Knocks against static objects

HEALTH AND SAFETY MEASURES:

* Technical/organisational measures (TOM):
  - When you go downstairs, use the stair rail and avoid distractions such as reading documents, checking your mobile phone, etc.
  - Check the state of the ground and any unevenness that there may be along the route.
  - Clean up spills of water, coffee or similar substances as soon as possible or inform the appropriate person.
  - Gather up and/or protect electrical cables and/or data cables in circulation areas.
  - Keep circulation areas and/or work areas as well as evacuation routes free from objects. Remove materials (chairs, tables and boxes, etc.) and/or equipment that is not required to complete the tasks.
  - Keep the drawers of filing cabinets or chests and the doors of cupboards closed.

* Health and safety information:  

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<td>Health and safety regulations</td>
<td>SHR 003 - Order, cleaning and maintenance</td>
<td>[link to the PDF]</td>
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</tbody>
</table>
USE OF PORTABLE LADDERS

RISK/S: Falling of people to a different level

HEALTH AND SAFETY MEASURES:

* Health and safety information: [link](http://www.upc.edu/prevencio/ca/informacio-en-pdf)

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<td>Health and safety regulations</td>
<td>SHR 203 - Portable ladders</td>
<td>[link to the PDF]</td>
</tr>
</tbody>
</table>
TASKS USING VISUAL DISPLAY UNITS

RISK/S: Discomfort caused by lighting: Visual fatigue
        Physical load: static work postures

HEALTH AND SAFETY MEASURES:

* Health and safety information: [link to the PDF]

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<td>ER 004/01 - Visual display units (VDU)</td>
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<tr>
<td>Ergonomic recommendations</td>
<td>ER 004/02 - Laptops</td>
<td>[link to the PDF]</td>
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<td>ER 004/03 - Office furniture</td>
<td>[link to the PDF]</td>
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<tr>
<td>Ergonomic recommendations</td>
<td>ER 004/04 - Exercises at the office</td>
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http://www.upc.edu/prevencio/ca/informacio-en-prl
# SAFETY AND HYGIENE REGULATIONS

## ORDER, CLEANING AND MAINTENANCE

<table>
<thead>
<tr>
<th>Code</th>
<th>SHR 003</th>
<th>Date:</th>
<th>July 2003</th>
<th>Revision:</th>
<th>Page: 1 de 1</th>
</tr>
</thead>
</table>

### RECOMMENDATIONS ACCORDING TO APPENDIX II ON ORDER, CLEANING AND MAINTENANCE OF ROYAL DECREE 486/1997, ESTABLISHING MINIMUM HEALTH AND SAFETY PROVISIONS FOR WORKPLACES

#### ORDER, CLEANING AND MAINTENANCE

1. Passageways, exits and routes around workplaces, particularly exits and routes intended for evacuation in cases of emergency, must be free from obstacles so that they can be used with no difficulties at any time.

2. Workplaces, including service premises and their respective equipment and installations, must be cleaned regularly and whenever needed to keep them in a suitable, hygienic state. The characteristics of floors, ceilings and walls will be such that they enable easy cleaning and maintenance.

   Rubbish, patches of grease, hazardous waste and other waste materials that could cause accidents or contaminate the work environment must be removed quickly.

3. Cleaning operations should not be a source of risk for the employees that undertake them or for other people. Consequently, they should be carried at the most suitable time, in the most appropriate way and with the right resources.

   *People who carry out cleaning operations must receive suitable training and information about the hazards of cleaning products, the safe use of cleaning equipment, and the use of personal protection equipment.*

4. Workplaces and their facilities in particular should be maintained regularly so that the working conditions always meet project specifications. Any faults that could affect the safety and health of employees must be resolved quickly.

   *Records must be kept of inspections, revisions and maintenance of workplaces and their facilities.*

   If a ventilation system is used, it must be maintained in good working order and have a control system that indicates any fault, if this is necessary for the health of workers.

   Maintenance of protection equipment must include checking that it is working correctly.

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**NOTE:** The text in blue are explanations from the Technical Handbook derived from Royal Decree 486/1997, which establishes the minimum safety and health provisions for workplaces.