MTRN4230 T2 2022 ROBOT-1: Safety Assessment

Learning Outcomes

- Implement good safety practices in the use of robots.

Aim

- Read and understand safety documents for operating robots.
- Complete online training for UR5e.
- Demonstrate safe operation of the UR5e

Due Date

- Week 2: Scheduled Lab Session
- (Early submission during week 1: Scheduled Lab Session is allowed for students who wish to complete this early. This is recommended as students will be able to operate the robot as soon as possible.)

Prior to Lab Demonstration

Setup

1. Ensure that you have followed the Virtual machine Installation Instructions.
2. Downloaded the UR5e User Manual for reference.

Safety

1. Read the Safety forms for UR5e operation linked from Moodle and "Declare as Read":
    a. Risk Management Form (RMF): ENG-MECH-RMF-21144
    b. Safe Work Procedure (SWP): ENG-MECH-SWP-11909
    c. Read through the relevant Australian Standards linked on Moodle:AS4024.3301 (2017): Robots and robotic devices—Safety requirements for industrial robots— Robots
    d. AS4024.3302 (2017): Robots and robotic devices—Safety requirements for industrial robots—
    Robot systems and integration
    e. AS4024.3303 (2017): Robots and robotic devices—Collaborative robots

Operation Training

1. Online UR5e Training
    a. Create a Universal Robotics account with your UNSW email address.
    b. Complete all 8 modules in the 'e-Series Core Track' Training, making use of the User Manual provided on Moodle and save your completion certificate to show to your demonstrator.

In-Lab Demonstration

UR5e Individual Operation – In Person:

1. Explain pre-start-up checks in accordance with the Safe Working Procedure
2. Power-up the Robot Arm for programming in accordance with Safe Working Procedure document.
3. Jog the tool to a pose specified by the demonstrator.
    a. We may ask you to move the UR5e in a specific direction.
    b. We may ask you to move the UR5e to a specific pose specified by the position of their hand. It doesn't need to be perfect, just reasonably close.
4. We will ask you to move the tool towards one of the safety planes chosen by the demonstrator and show how the safety planes limit robot operation.
5. Bring the Robot Arm back to home position.
6. Safely disable power to the Robot Arm

UR5e Individual Operation – Online stream students:

(This option is only available to online students. All other students must come into the lab in person to complete the in-lab demonstration)
The following will be all be performed within the URsim, and students are expected to screenshare via MS Teams and talk.

1. Explain pre-start-up checks in accordance with the Safe Working Procedure
2. Show that the correct default safety installation has been loaded into the URsim.
3. Power-up the Robot Arm for programming in accordance with Safe Working Procedure document.
4. The demonstrator will show you picture of ur5e in URsim from the base frame and you will be required to move to that pose. It doesn't need to be perfect, just reasonably close.
5. Move the tool towards one of the safety planes chosen by the demonstrator and show how the safety planes limit robot operation.
6. Bring the Robot Arm back to home position.
7. Safely disable power to the Robot Arm

Understanding of Safety – In Person and Online Stream Students

Students will be asked to answer 2 – 3 questions drawn from the Risk Management Form (RMF), Safe Work Procedure, AS4024.3301, AS4024.3302, AS4024.3303 and the week 1 lecture.

We do not expect students to know all parts of the Australian Safety Standards, only the core information presented in the lecture.

For example:

- Who are the intended users of AS4024.3301? (See the standards)
- What does collaborative operation mean? (See the standards)
- Describe two safety devices that can be used to safeguard the robot. (See the standards)
- Explain Hazard/Task "Robot tool causing damage to user or equipment". (See the RMF)
- Explain the Shutting Down procedure of the robot. (See the SWP)

Marking Criteria

The overall mark for this assessment is 5% of the final course mark. It has been distributed as below. Late submissions are not permitted without a special consideration application being approved.

Item	Value	Description
Safety Documents	0%* (hurdle)	Submit Induction code to web-form. Declare Safety Documents (RMF & SWP) as read in Safesys.
Online UR5e Training	0%* (hurdle)	Show E-series Core Track Certificate to Demonstrator prior to attempting the 'UR5e Operation' Task
UR5e Start-up/Shutdown	1%	Safe start-up /shutdown of UR5e with the specific steps according to SWP.
UR5e Operation	2%	Demonstrate basic competency in jogging the robot (selection of correct mode, understanding of directions and terminology).
Understanding of Safety	2%	Answer questions verbally from the demonstrator on how standards have been applied to this collaborative robot system.