NIP1 — NIP1 TASK 2: DISASTER RELIEF ROBOT

INTRODUCTION TO ARTIFICIAL INTELLIGENCE — C951
PRFA — NIP1

COMPETENCIES

4036.1.11: : **Machine Learning**
The graduate creates models with machine learning algorithms in order to extract actionable insights from data.

4036.2.1: : **Reasoning, Knowledge Representation, Uncertainty, and Intelligence**
The graduate analyzes the relationships and rules pertaining to intelligence within systems.

4036.2.2: : **Search Strategies for Optimization**
The graduate distinguishes among search strategies to fit specific data-oriented problems.

4036.2.3: : **Agents**
The graduate implements basic intelligent agent technology in order to automate services.

4036.3.1: : **Robotics**
The graduate writes code to enable robots to execute simple tasks.

INTRODUCTION

Real-time search-and-rescue robots are increasingly used to supplement the efforts of the first responders in areas affected by natural disasters. They are used to spot-check the situational awareness of people in distress, survey the extent of flood or tornado damage and the number of people that had not been evacuated from their neighborhoods, and clean debris and create passable routes.

SCENARIO

For this task, your first step will be to familiarize yourself with the Coppelia Robotics BubbleRob virtual robot and its environment. To do this, please review the information at the "BubbleRob Tutorial," "Coppelia Robotics Resources Page," and "Coppelia Robotics V REP Environment" web links below. The BubbleRob is a very basic robot that can be used in disaster recovery.

For the next step in this task, you will thoroughly describe a disaster situation similar to the ones mentioned in the introduction. Next, you will create a virtual prototype of an autonomous robotic recovery system that demonstrates goal-seeking behaviors in navigating through a predefined area. The robotic recovery system will solve a disaster recovery problem of your choice by using the Coppelia Robotics BubbleRob and its environment, modified with at least two new obstacles, as the starting point of your prototyping. You will also add one or more sensors of your choice to the robot: these sensors will collect vital information to aid in the disaster recovery effort for the scenario you described.

REQUIREMENTS

Your submission must be your original work. No more than a combined total of 30% of the submission and no more than a 10% match to any one individual source can be directly quoted or closely paraphrased from sources, even if cited correctly. An originality report is provided when you submit your task that can be used as a guide.

You must use the rubric to direct the creation of your submission because it provides detailed criteria that will be used to evaluate your work. Each requirement below may be evaluated by more than one rubric aspect. The rubric aspect titles may contain hyperlinks to relevant portions of the course.

A. Describe the disaster recovery environment and the obstacles you have added to the environment.

B. Explain how the robot will improve disaster recovery in the environment with two or more additional obstacles.

C. Justify the modifications you made to BubbleRob's architecture, explaining how additional sensors will aid the disaster recovery effort.

D. Explain how optimization principles are implemented in the prototype and how these optimization principles include the concepts of reasoning, knowledge representation, uncertainty, and intelligence.

E. Explain the advantages and limitations of the robot as well as the criteria for assessing the success of the prototype in solving the problem.

F. Outline a plan for the testing and implementation of the robot.

G. Explain how the prototype could be further improved, including how reinforced learning can optimize the prototype's performance.

H. Submit the robot code.

I. Provide a Panopto video recording that describes the robot and demonstrates its functionalities to stakeholders that are non-practitioners, including the following:

- a statement of the disaster recovery problem
- a summary of the environment and the obstacles
- a summary of the robot's goal and objectives
- a description of the robot and its architecture
- a demonstration of how the robot meets its disaster recovery goals
- an assessment of the robot's capabilities
- an explanation of how to improve the prototype
- an explanation of the benefits of using the robot in disaster recovery

Note: For instructions on how to access and use Panopto, use the "Panopto How-To Videos" web link provided below. To access Panopto's website, navigate to the web link titled "Panopto Access", and then choose to log in using the "WGU" option. If prompted, log in using your WGU student portal credentials, and then it will forward you to Panopto's website.

To submit your recording, upload it to the Panopto drop box titled "INTRODUCTION TO ARTIFICIAL INTELLIGENCE – NIP1 Task 2 | C951." Once the recording has been uploaded and processed in Panopto's system, retrieve the URL of the recording from Panopto and copy and paste it into the Links option. Upload the remaining task requirements using the Attachments option.

J. Acknowledge sources, using in-text citations and references, for content that is quoted, paraphrased, or summarized.

K. Demonstrate professional communication in the content and presentation of your submission.

File Restrictions

File name may contain only letters, numbers, spaces, and these symbols: ! - _ . * ' ( )
File size limit: 200 MB
File types allowed: doc, docx, rtf, xls, xlsx, ppt, pptx, odt, pdf, txt, qt, mov, mpg, avi, mp3, wav, mp4, wma, flv, asf, mpeg, wmv, m4v, svg, tif, tiff, jpeg, jpg, gif, png, zip, rar, tar, 7z

RUBRIC

A:PROBLEM

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A submission describing the disaster recovery environment is not provided.	The submission describes the disaster recovery environment but does not include the additional obstacles, or the information provided contains inaccuracies.	The submission describes the disaster recovery environment with two more additional obstacles.

B:IMPROVED DISASTER RECOVERY

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A submission explaining how the robot will improve disaster recovery is not provided.	The submission explains how the robot will improve disaster recovery, but it does not address the two or more additional obstacles, or the information provided contains inaccuracies.	The submission explains how the robot will improve disaster recovery in an environment with two or more additional obstacles.

C:ARCHITECTURE

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A submission justifying the modifications to the robot's architecture is not provided.	The submission justifies the modifications to the robot's architecture, but it does not explain how the additional sensors will aid the disaster recovery effort, or the	The submission justifies the modifications to the robot's architecture and explains how the additional sensors will aid the disaster recovery effort.

information provided contains inaccuracies.

D:GOAL SEEKING

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A submission describing how optimization principles are implemented in the prototype is not provided.	The submission explains how optimization principles are implemented in the prototype, but it does not explain how these principles include the concepts of reasoning, knowledge, representation, uncertainty, and intelligence, or the information provided contains inaccuracies.	The submission describes how optimization principles are implemented in the prototype and explains how these principles include the concepts of reasoning, knowledge, representation, uncertainty, and intelligence.

E:ADVANTAGES AND LIMITATIONS

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A submission explaining the advantages and limitations of the robot is not provided.	The submission explains the advantages and limitations of the robot but it does not describe the criteria for assessing whether the prototype solves the problem, or the information provided contains inaccuracies.	The submission explains the advantages and limitations of the robot and it does describe the criteria for assessing whether the prototype solves the problem.

F:TESTING AND IMPLEMENTATION PLAN

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A submission outlining the testing plan for the robot is not provided.	The submission outlines the testing plan for the robot, but does not outline the implementation plan, or the information provided contains inaccuracies.	The submission outlines the testing plan for the robot and the implementation plan.

G:IMPROVING THE PROTOTYPE

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT

A submission explaining how the prototype can be further improved is not provided.	The submission explains how the prototype can be further improved, but it doesn't discuss how reinforced learning can optimize the prototype's performance, or the information provided contains inaccuracies.	The submission explains how the prototype can be further improved and it discusses how reinforced learning can optimize the prototype's performance.

H:CODE

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A submission of the robot code is not provided.	Not applicable.	The submission includes the robot code.

I:PANOPTO RECORDING

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
A Panopto link is not provided, the Panopto link is not correct or is inaccessible, or the video recording does not describe the robot or demonstrate its functionalities.	The Panopto video recording demonstrates the robot's functionalities to stakeholders who are non-practitioners, but the video recording does not include at least 1 of the required points.	The Panopto video recording demonstrates the robot's its functionalities to stakeholders that are non-practitioners and the video recording addresses all of the required points.

J:SOURCES

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT
The submission does not include both in-text citations and a reference list for sources that are quoted, paraphrased, or summarized.	The submission includes in-text citations for sources that are quoted, paraphrased, or summarized and a reference list; however, the citations or reference list is incomplete or inaccurate.	The submission includes in-text citations for sources that are properly quoted, paraphrased, or summarized and a reference list that accurately identifies the author, date, title, and source location as available.

K:PROFESSIONAL COMMUNICATION

NOT EVIDENT	APPROACHING COMPETENCE	COMPETENT

Content is unstructured, is disjointed, or contains pervasive errors in mechanics, usage, or grammar. Vocabulary or tone is unprofessional or distracts from the topic.	Content is poorly organized, is difficult to follow, or contains errors in mechanics, usage, or grammar that cause confusion. Terminology is misused or ineffective.	Content reflects attention to detail, is organized, and focuses on the main ideas as prescribed in the task or chosen by the candidate. Terminology is pertinent, is used correctly, and effectively conveys the intended meaning. Mechanics, usage, and grammar promote accurate interpretation and understanding.

WEB LINKS

BubbleRob Tutorial

Coppelia Robotics Resources Page

Coppelia Robotics V REP Environment

Panopto Access
Sign in using the "WGU" option. If prompted, log in with your WGU student portal credentials, which should forward you to Panopto's website. If you have any problems accessing Panopto, please contact Assessment Services at assessmentservices@wgu.edu. It will take up to two business days to receive your WGU Panopto recording permissions once you have referred for the course.

Panopto How-To Videos

Panopto FAQs