**Introduction to Artificial Intelligence – C951**

**TASK 2: DISASTER RELIEF ROBOT**

**Course Overview**

Introduction to Artificial Intelligence explores the foundational principles and practices of artificial intelligence (AI), machine learning, and robotics. The course prepares students to analyze relationships, build agents, and create models relevant to AI problems. The prerequisites for this course are Introduction to Probability and Statistics as well as Data Structures and Algorithms II.

**Objective Assessment Task 2 Overview**

**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