**C951 Task 2: Disaster Relief Robot**Lydia Strough, WGU#00245262404/05/2023

**Section A: Disaster Environment**

The environment is as follows: “Lydia\_Strough\_C951\_Task\_2\_Disaster\_Relief\_Robot” has been deployed in a Kosovo minefield. Riddled with landmines, each containing an estimated few hundred bombs, the environment is too dangerous for the people of Kosovo to inhabit. The disaster relief robot has been tasked to detect these landmines so the locals can deactivate them one at a time. The simulation depicts the disaster relief robot exploring the environment, searching for landmines. Landmines are represented by red cylinders (there are two of them in the simulation).

**Section B: Improved Disaster Recovery**

As described in section A, the simulation depicts the disaster relief robot exploring the environment, and searching for landmines. Landmines are represented by red cylinders (there are two of them in the simulation). When a landmine is detected, the robot will indicate this by changing its sensor color and providing a message indicating so. This robot will aid the people of Kosovo by identifying the landmines' location, allowing them to deactivate them. Eventually, the people of Kosovo will be able to walk through these minefields without fear, allowing them to restore the land.

**Section C: Architecture**

“Lydia\_Strough\_C951\_Task\_2\_Disaster\_Relief\_Robot” is based on the bubbleRob tutorial. This robot has two sensors – one blue and one red. The blue sensor acts as a landmine detection sensor, and the red sensor acts as a proximity sensor. The proximity sensor tells the robot when it’s about to run into an object and tells the robot to go a different way. The landmine detection sensor changes color in the presence of a landmine (red cylinder). The (red) proximity sensor will keep the robot safe, lessening its chances of injury. The (blue) landmine detection sensor will give people the information they need to identify where landmines are in the robot's current environment.

**Section D: Internal Representation of the Environment**

As described in section C, the robot has two sensors, a blue landmine detection sensor, and a red proximity sensor. When the robot is about to hit an object the proximity sensor tells the robot to go a different way. Similarly, when the robot is a certain distance from a red cylinder (landmine), the landmine detection sensor will change from blue to green, and a message will be relayed that the robot has encountered a landmine. The robot will continue to move forward until the proximity sensor tells it otherwise. The messages indicating that the robot is in contact with the landmine will continue to send until the robot is no longer within range of the landmine.

**Section E: Reasoning, Knowledge Representation, Uncertainty, and Intelligence**

**Reasoning**: If the robot detects an object with its proximity sensor, then the robot starts to back up to avoid hitting the object. As the robot is backing up, the robot’s direction steers away from the object in front of it at a slower pace. If the robot detects a landmine with its landmine detection sensor, then the robot signals this and changes the color of the sensor from blue to green. The messages continue to send, and the color of the sensor is green until the robot is no longer within range of the landmine.

**Knowledge Representation**: As described in section C, the robot has two sensors, a landmine detection sensor, and a proximity sensor. Both sensors allow the robot to collect information about its environment. The proximity sensor detects all objects within a specific proximity of the robot, and the landmine detection sensor specifically detects landmines within a specific proximity of the robot.

**Uncertainty**: Due to the adaptability of the robot's sensors, the robot will have no issues venturing through an unknown environment. The robot’s proximity sensor will keep the robot safe while it explores the new environment and identifies landmines with its landmine detection sensor.

**Intelligence**: The robot’s adaptability ensures that the robot can achieve its goal, even in an unknown environment, with minimal setbacks. The proximity sensor keeps the robot safe, and the landmine detection sensor signals the detection of a landmine.

**Section F: Further Improvements**

**Reinforced Learning:** Reinforced learning could be used to improve this robot. Providing rewards and penalties for specific outcomes could aid the robot in keeping track of specific paths it has taken, ensuring all land is covered and all landmines are found.

**Advanced search algorithms:** Advanced search algorithms could be used to improve this robot. Similarly, to reinforced learning, advanced search algorithms could ensure all land is covered and that all landmines are found. The difference is advanced search algorithms could increase the efficiency of the robot.   
  
Both concepts could improve the performance of the robot, aiding in faster goal achievement.

**Section G: Robot Code**

The disaster relief robot code files are attached in the “Disaster\_Relief\_Robot.ttt.zip” file.

**Section H: Panopto Recording**

Below is a link to a Panopto video recording. The recording describes the robot and demonstrates its functionality. This includes:

* 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

<https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=11ccae2a-0e61-4d82-a1d2-afdc0179a2e8>

**Section I: Sources**

No outside sources were quoted, paraphrased, or summarized.