C951 – Intro to AI Task 2

1. **Disaster Recovery Environment**

The disaster recovery environment I have chosen is to be a collapsed building with scattered rubble. Given, in this simulation it has been scaled down and simplified for the purpose of demonstration. There could be an unexpected number of debris and obstacles laid around, and the robot would have to be smart enough to roughly discern where a potential person might be trapped. The specific obstacles I have chosen and represented in the simulation are girders/beams that have fallen, columns, boxes, walls, and tanks.

1. **Robot’s Disaster Recovery Abilities**

This modeled robot will improve disaster recovery by moving across an environment and searching for potential trapped victims and reporting back that they were found. This could help reduce the risk of a person needing to go into the building if no one is trapped inside. The robot ideally will be able to climb over small debris, maneuver around larger objects, and fit into spaces smaller than a human would normally be able to.

1. **Robot Modifications**

The modifications made to this robot include two sensors, one for proximity scanning to avoid getting stuck on objects, and one for scanning for potential victims. It is currently equipped with a system of two wheels to propel it forward and reverse when needed, as well as the main body. (The robot used was taken from the BubbleRob model, with a sensor added). This robot will be able to navigate the debris like a robot vacuum, in its current capacity.

1. **Robot’s Internal Environment**

The robot has a rudimentary vision sensor to “see” what the environment looks like, as well as using the proximity sensor for movement. It currently does not contain much pathfinding retention and can sometimes get stuck on an object if the angle/speed it hits it at is just right.

1. **Robot’s Features**

The robot’s **reasoning** model is that it is continuously scanning for a victim and avoiding obstacles. If it detects an obstacle, it will attempt to maneuver around it. Meanwhile when a victim is found, it is reported. The robot has **knowledge representation** by having a specified sensor for victims to differentiate between a person and their environment, as well as objects it may run into. However, the robot also has a sense of **uncertainty** due to the path and turning being adjusted by the speed of the robot, and the ability to back up when needed. The robot’s **intelligence** would most likely be its ability to course correct and identify a person that is trapped.

1. **Potential Improvements**

Improvements that could be made to this robot would be a method of control by a human in situations that might need granular and focused control rather than a “scanning” method. Another improvement would be a method of climbing over uneven objects or debris by use of tracks or wheels that function more appropriately for the environment that it will end up in, as well as break through thinner debris. A final method of improvement would be leaving a trail of lights or calculating the shortest path to a trapped person from the route that it has traveled. Another improvement might be audio sensors that are able to hear people who might be calling for help, to pair with an improved visual sensor. **Reinforced learning** would immensely help the bot by being able to skip over areas that might be deemed as unable to contain a person, and **an advanced search algorithm** could be used in conjunction with larger sensors to take in more of the environment at once and direct a path on its own rather than scan as it would do so now.

1. **Sources**

**C951 Getting Started with CoppeliaSim**

[**https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=fac0a84e-e077-4e42-974e-acd30172e7c0**](https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=fac0a84e-e077-4e42-974e-acd30172e7c0)