C951 Task 2

A: DISASTER ENVIRONMENT

The robot is navigating a building whose structural integrity was damaged following an earthquake. There are some pieces of rubble that the robot must navigate around to get through the door, and the outside walls are still intact, so the robot must navigate through an opening. In addition, due to the earthquake, some communications have been disrupted, and the robot must be in range of the rescue team to transmit data.

B: IMPROVED DISASTER RECOVERY

The robot will create map data and a visual feed as it navigates in damaged structures, which will then be relayed to rescue teams. Because the buildings may not be safe for rescue teams to travel, this robot will allow teams to safely traverse the building to assess the situation and look for survivors who may be injured or trapped. To navigate the building, the robot is equipped with a proximity sensor on its front, which allows it to avoid collisions with walls and rubble. It is equipped with another sensor at the top to check if it is in range to transmit data to the rescue team. This will help the teams to prioritize their efforts, which will increase their effectiveness in finding survivors and saving lives while also ensuring their own safety.

C: ARCHITECTURE

The proximity sensor on the front is essential for the robot to navigate without colliding with walls, objects or rubble. The sensor on top is needed to see if the rescue team is in range so the data can be transmitted. This is essential because of the damage to communication infrastructure in the community which was caused by the earthquake.

D: INTERNAL REPRESENTATION OF THE ENVIRONMENT

The robot will maintain a representation of the environment by using the sensors to detect obstacles in front of it. This information will be stored internally and transmitted to the rescue teams later. In this way, it will be able to create a representation of its environment.

E: REASONING, KNOWLEDGE REPRESENTATION, UNCERTAINTY, AND INTELLIGENCE

The robot will collect information about its environment using its sensors to map out the location of objects and walls. It will make decisions based on that information to navigate safely and to transmit data. The robot adapts to the environment by changing its direction

when its path is obstructed. It uses it ability to create a representation of the environment to navigate and ultimately find its way around. In this way it can overcome obstacles and achieve its goal.

F: FURTHER IMPROVEMENTS

The prototype could be improved by adding some sensors to capture more data about the environment more efficiently. This might include some proximity sensors on the sides to capture more of a comprehensive representation of the environment, and it may include a bigger range for the sensors already present. Reinforced learning could be used to improve the efficiency of the prototype by allowing the robot to recognize patterns and make a quicker decision with regards to the path it should take. Currently, it uses a very simple method to change direction which could result in the robot wasting a lot of time in some situations (such as when it needs to make a right turn - currently it is programmed to make only left turns). If reinforced learning were implemented, the robot would be able to approach these situations in a much more efficient manner and avoid delays. Advanced search algorithms could be used to improve the efficiency of identifying the obstacles and making decisions.This would make it much quicker to figure out the next path to take, especially when combined with machine learning. Implementing both of these together would greatly improve the robot's performance and learning capabilities.

I: SOURCES

No outside sources were referenced or cited in this document.