Introduction to AI C951

Task Two

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1. **Disaster Recovery Environment and Two Obstacles**

The disaster recovery environment is designed to simulate an office full of toxic fumes and gas. The walls represent the structure of the office that also has an entrance but anything inside the office is considered dangerous and should be avoided. The cylinder represents the person that must be found. The robot must detect a person and send a message to the console screen. There are two additional sensors that will detect the presence of a wall to navigate through the office. The bot is also equipped with a long-range sensor to detect people and will send a message, “Person Detected!” to the console screen. The second obstacle is a series of sharp corners and walls that the bot must navigate through until a person is detected.

1. **Disaster Recovery Improvement**

In the event of a gas leak or presence of toxic fumes, this makes it very dangerous as these are highly flammable and a risk for first responders at the scene. Utilizing the recovery bot would be useful as we can prevent injury or death. This bot utilizes different sensors and a camera to navigate through such harsh conditions. It would allow also first responders to know where exactly the person is located and their well-being. Overall, this will help rescue teams not inhale toxic fumes or gas and quickly save people in need.

1. **Sensor Modifications**

The modifications that we made to the bot’s architecture was by adding two additional proximity sensors in front of the bot. This is designed to be like the original sensor but did not have a wide view. Although, we did have to scale back on the turning because it was a bit excessive originally. I also added a long-range sensor that can identify people, which in this case, is a cylinder. These sensors aid the disaster recovery environment as it allows us to efficiently navigate through harsh corners and identifying people quickly from a distance.

1. **Internal Representation of the Environment**

My bot keeps an internal representation of the environment as it will draw a path at every seven points. This is beneficial as this will allow first responders to quickly identify where they need to go to find the person in real time.

1. **Bot implements the following four concepts: reasoning, knowledge representation, uncertainty, and intelligence.**

**Reasoning**: The bot demonstrates reasoning by determining its course of action in specific situations. For example, when it encounters an obstacle, it can choose between reversing or moving forward, a decision is guided from its proximity sensors.

**Knowledge Representation:** The bot maintains its current state (forward or backward) and its current speed. Information about obstacle detection is represented through its proximity sensors. The code for the bot represents knowledge about the presence of a person by detecting the PersonToDetect object.

**Uncertainty:** The bot faces uncertainty in the environment if there is an unexpected situation which could ultimately decrease its ability to effectively navigate. There is uncertainty as well when the bot detects an object using the proximity sensor ‘noseSensor\_ToDetect’ as we may not know the exact position of the person being detected.

**Intelligence:** The bot implements intelligence as its ability to make informed decisions such as, recognizing a ‘person’ and can make real time adjustments whether to move forward or backward. The bot also demonstrates intelligence by displaying a path trace during its navigation in the environment.

1. **Explain how the prototype could be further improved, including how reinforced learning and advanced search algorithms can improve the prototype’s performance and learning.**

The prototype could be improved if we included an additional sensor that can detect the height of any given object in its range of view. It can also be improved with reinforced learning and advanced search algorithms because it helps make the bot make better decisions regarding dynamic changes in the environment which includes obstacles and allow the bot to find the shortest and safest path to reach its destination.

**Panopto Link:** <https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=93504162-26ad-411c-a905-b0a600283da7>

**Sources:**

No sources were used in this task.