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What exactly are you proposing to do?

For our semester project, we are planning on implementing environment mapping into robot simulations. We would like to be able to give the robot an unknown map, the robot will perform a specific algorithm and move around the room while using the distance sensor to find objects, and then it will output a picture file of what it thinks the map looks like. The picture will be the best-guess approximation of the room which we hope will be very close to the actual room.

We will implement all this in ROS and python. The project will be started by expanding from one of the existing labs that we have already used.

How will you do it (methods/techniques/sensors)?

Our plan is to create a robot that has the ability to map its environment using a mapping algorithm and sensors on the robot. The main sensor that will be needed is a laser that reads the distance of obstacles in the front of the robot. We will have a mapping algorithm that stores the coordinates (in global coordinates) of the obstacles. In order to do this, it must keep track of where the robot is in global coordinates and its angle. From there we will reconstruct an image file displaying a map of the robot's environment. We plan on using A Star algorithm or another path finding algorithm to aid in the navigation process.

What are the subgoals of your proposals, and when will each of these be done?

One of our subgoals is to implement a failure system. If our original SLAM algorithm approach does not work, we could step backwards through our path (or list of coordinates) and retry scanning the room with a modified SLAM algorithm. This task will likely be top priority.

Another one of our subgoals is to output a PNG of the room based upon the data that our robot has gathered and possibly draw each point where the robot scanned a unique, new wall coordinate. This will be of moderate priority as it will be helpful during debugging.

Who in the group will do what?

Patrick - Picture generation and mapping algorithm

Daniel - Launch file and environment creation and mapping algorithm

Jadwin - Robot Movement and mapping algorithm