EXPLORATION

Being able to autonomously navigate through the whole environment is necessary for a reconnaissance bot to generate a map and locate victims. There are several reasons why autonomous navigation is useful in a reconnaissance robot in a disaster environment. First, it allows the robot to explore and gather information about the environment without the need for a human operator. This can be useful in situations where it is not safe for humans to be present, such as in a disaster zone. Second, autonomous navigation enables the robot to quickly and efficiently explore a large area, which can be useful for search and rescue operations. In this project, Rapidly Exploring Random Trees (RRT) [10] [11] algorithm is used for exploration. RRT is heavily biased towards unexplored regions and is ”complete”, which means that it will always find a feasible path from the start to the goal if one exists. However, the completeness of RRTs comes at the cost of potentially generating a large number of paths and taking a long time to run. The algorithm generates a tree-like data structure in the environment, with branches representing possible paths that the robot can take. The algorithm then randomly samples points in the environment and tries to connect them to the tree, using local and global planning algorithms to determine the feasibility of each path. This process continues until the robot reaches its destination or the tree covers the entire space. RRTs are useful for autonomous navigation in complex environments because they can quickly find a feasible path even in cluttered or unpredictable situations.