Research Report
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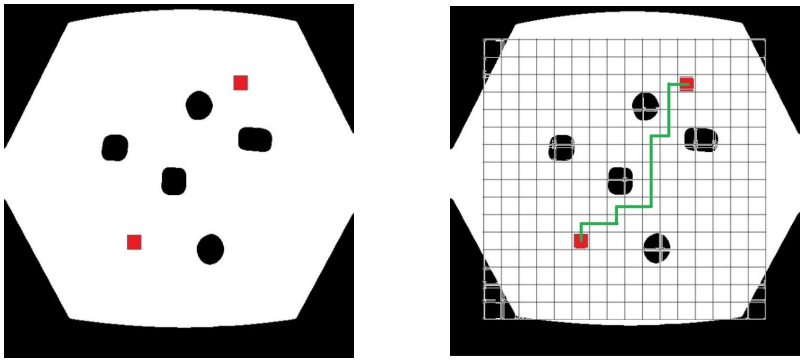
The project that I worked on was to allow a robot to move autonomously avoiding obstacles as necessary. I was part of the motion planning team where we were primarily tasked to help maneuver the robot through free space. This team consists of various algorithms that are taken from data to convert into birds-eye view maps.

I started my research with literature reviews where I found Dynamic Programming; finds the optimal solution to any problem if that solution exists. Dynamic Programming is used in the context of solving complex problems by breaking them down into simpler sub-problems. Next, I came across Djikstra's Algorithm which finds the shortest path between nodes in a graph. The algorithm creates a tree of shortest paths from the starting vertex, the source, to all other points in the graph. Using both of these examples, A star algorithm was developed. I gathered up all my research and started making my own algorithm that implements all the studies. I found many examples of A star code and tried applying it to my own algorithm for cell decomposition. My algorithm consisted of iterating through grids in a graph and could locate obstacles and free space. With this algorithm, I can take any grayscale images with starting and ending points to find the shortest path between them.



Path Finding Cell Decomposition Algorithm
using A* from Kinect Azure Camera

Throughout this immersive 10 week experience, I was able to accomplish and learn a great number of aspects. Since we had weekly presentations and meetings, my presentational and communicational skills have grown. I was also able to expand on my programming skills as well; I had beginner knowledge in Python, but now I can use OpenCV and other functions. My knowledge of motion planning and autonomous vehicles has helped me explore my career interests as well.

References

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