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Engineering Design and Path Planning Implementation for Autonomous Rover

The objective of the study is to provide undergraduate students an opportunity to conduct research and engineering design in the area of autonomous robotics. The engineering design aspect of the project involved the reengineering of a powered wheelchair and the design of electrical, electronic, and software interfaces. Application of path planning algorithms took the form of a modified A* implementation for indoor autonomous travel, and a PixHawk autopilot system for outdoor autonomous navigation.

The testing of the modified A* algorithm was conducted by using the hallways of Shepherd University as a real-world representation of the rover's virtual map. The rover's internal understanding of the map was an outline of the local space and required the robot to respond to the unknown objects in the environment to appropriately navigate from its starting point to the endpoint. The goal of the outdoor autonomous navigation was to implement GPS-based navigation in a large open area like a parking lot without any obstacles.

The initial findings are that the engineering design for the rover is a success and that it initially shows the capability of receiving and responding to autonomous navigation cues. This project remains ongoing and will continue to be available to future computer science and engineering students at Shepherd University who are interested in autonomous robotics design and research.

Funding and support for this project are provided by JLG Industries, Inc., Professor Jason Miller, and Prof. Weidong Liao of Shepherd University's CME Department.