ABSTRACT

The Advent of modern technology has enabled various workloads previously handled by human operators to be transferred to automated machines. One such example of these types of technology are warehouse robots where the task of inventory management and goods handling can now be performed without a human operator behind a machine.

In structured environments where routes and a set of traffic rules determines the behavior of the robot, the probability of deadlock and collisions can be much easily avoided. In unstructured environments where the robot does not have prior knowledge of the area let alone routes, can prove to be a challenging task in order for the robot to be able to reach its objective without facing any stoppages due to obstacles that are present in unstructured environments.

The objective of this thesis is to provide solutions to overcome the difficult nature of navigating through unstructured environments with a LIDAR as its only sensing tool to detect its surroundings. Due to the 2-dimensional scan provided by LIDAR, further advancements in algorithm to utilize a 3-dimensional LIDAR sensor would make the solution in this thesis more robust in a wider range of environments.

The solutions presented in this thesis will be tested in CoppeliaSim, a powerful robotics simulation software with features to conduct almost any types of simulations on any robot build that the user chooses

Keyword: Autonomous Guided Vehicle, LIDAR, Obstacle Avoidance, CoppeliaSim, Static Obstacles, Dynamic Obstacles