Executive Summary

The following is a proposal for a Senior Design Project consisting of the adaptation of an AmigoBot for use as a survey robot. Our goal is to allow the robot to traverse a given rectangular area delimited by coordinates on a GPS receiver, detect and avoid obstacles in its path and at the same time map them onto an empty map of the area.

The project involves both hardware and software development. In the hardware part we must build a GPS differential receiver which will allow us to use the GPS with a greater resolution, interface a controller to the robot's sensors and motors and the GPS. The software part will involve developing a navigational algorithm for traversing a square room as well as reactive obstacle avoidance behaviors. In addition there must be a mapping algorithm which can translate detection of obstacles into images on a map.

Testing will be done in continuously and in stages. We will first develop and test the hardware components and the communications. The second stage will be to integrate a navigation algorithm with obstacle avoidance to enable the robot to move autonomously. The final stage will be to incorporate a mapping software that will show the obstacles encountered by the robot during its trajectory.

This system could lead to future projects involving more extensive mapping, as well as route-learning and optimization. This robotic platform will be also an excellent test-bed for utilizing DGPS in small-scale applications and could lead to low cost precision guidance systems.