



Senior Design Project in Electrical & Computer Engineering



NDGPS Antenna Research

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Project Background

The introduction of Nationwide Differential Global Position System (NDGPS) coverage has resulted in many innovations for DGPS that require more accurate signal correction and coverage. As a result, users now desire greater accuracy without post processing. This new desire coincides with the Coast Guard's recapitalization of the DGPS system. It is an excellent time to evaluate what changes can be made to the reference station GPS antenna to help mitigate the error within the system and improve accuracy to the end user. A significant component of the error budget is caused by signal multipathing. Multipath occurs when the desired signal reflects off various structures and surfaces causing a delayed copy to arrive shortly after the original signal. This delayed signal can induce position errors up to 15 meters.



Project Plan

The first part of the project will involve studying various possibilities of measuring multipath errors relating to environmental and technical factors. Pending the development of a measurement system, research will be conducted on various antennas to evaluate their ability to minimize multipath signal reception. Ideally, the goal is to choose the optimum antenna for cost, durability, and effectiveness.



Project Work

The research process will include creating a baseline measurement from the original reference station antenna. This baseline will be used to compare the other antennas to with regards to how they mitigate multipath errors. Further investigation into minimizing multipath may focus on choker rings or deflective shields as external factors in minimizing multipath errors.



Project Deliverables

At the conclusion of the research period, the optimum antenna for mitigating multipath issues will be recommended. Supporting documentation including testing procedures, results and cost analysis will be included to provide the logical reasoning for the selection of the antenna. Furthermore, an analysis of combining the GPS antenna and the integrity monitor on the same antenna will be submitted.

