



Senior Design Project in Electrical & Computer Engineering



NDGPS MULTIPATH ANALYSIS DESIGN

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Sponsor: C2CEN

Project Background

Nationwide Differential Global Positioning System (NDGPS) is the newest update to GPS and is now highly demanded by many industries, including automotive and maritime. With an increase in users and applications, increased accuracy of the system is highly demanded by consumers. Currently, several factors cause errors of the GPS signal to a receiver, but the largest factor is multipath. Ideally, a GPS signal propagates in a straight line to a receiver, but due to reflections off objects (buildings, trees, water, mountains, etc.) an error is created in the "assumed" position of the receiver. This is multipath and the error can be up to 15 meters. The Coast Guard wants to mitigate the error dramatically for their receivers at NDGPS sites, and have contracted Ohio University to determine the most cost effective and economical antenna. The Electrical Engineering Department of the Coast Guard Academy has been tasked by the Coast Guard to design a testing procedure and research the best antenna. The impact of the increased accuracy of DGPS would allow more users and more applications of the system.



Project Team at ION: GNSS conference in Long Beach, CA

Project Plan

The first part of the project entails measuring multipath errors in various antennae and compare the results to those gathered from last year's project. Upon completion of part one, research shall be conducted in order to mitigate the multipath error in the antennae and then determine which antenna studied has the least multipath error. Finally, a testing procedure will be designed and used in determining multipath error and testing how much error is mitigated .

Project Work

Using the original reference station antenna as a baseline, a series of measurements will be taken from commercial, off-the-shelf antennae. From these measurements, the commercial antennae will be compared to the reference station antenna to determine the success of multipath mitigation in each antenna and if other products are needed to help mitigate the multipath error in the antenna, they will also be researched. The best antenna will be recommended to the Coast Guard, and a testing procedure for multipath mitigation of an antenna will be created to be used by the Coast Guard.

Project Deliverables

Upon completion of the project, the most suitable antenna for the Coast Guard will be recommended, including the cost and benefit analysis of the antenna compared to the other antennae researched. Verification of last years testing, as well as new testing, will also be a product of the project. A recommendation of prime areas for potential improvement in the type and location of an antenna will be submitted.

