

Authentication of Active Sonar in a Multiuser Environment

Principal Investigator: Dr. Bijan Mobasseri

Project Summary

Sonar broadcasts in underwater acoustic channels is common. Applications include ranging, target detection, guidance and imaging. Many sonar emissions are not even man-made and originate from biological sources. In a pioneering work, our research team proposed the idea of embedding a transparent digital watermark in selected time-frequency cells of the sonar waveform and exhibit robustness to the acoustic channel. A received sonar can be searched for the presences of the watermark leading to its authentication. In any practical scenario, however, there will be multiple vessels broadcasting multiple sonars simultaneously and perhaps in close vicinity of each other. Therefore, the problem of watermark detection is no longer a question of whether an intercepted sonar is watermarked but which watermark it is carrying. In this work we are researching to extend the single user watermarking approach to a multiuser environment and formulate a solution within the multiple hypothesis testing framework to achieve a specified level of statistical significance. The work is validated using Navy-exclusive simulation tools followed by sea trials.