

Sonar Identification and Authentication Using Embedded Digital Watermarks

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Project Summary

Signals are often characterized by parameters such as amplitude, frequency, phase or modulation. However, once transmitted it is generally difficult to identify signal's sources, i.e. where they came from or who sent them. In a complex undersea environment where a multitude of simultaneous acoustic transmissions may exist, it is desirable to characterize sonar echoes based on their points of origin. In active sonar applications, it is important to know that the sonar echo picked up by the emitting platform is indeed authentic. The adversary may want to manufacture echoes to mislead, confuse and ultimately evade detection. In large scale naval operations, it is helpful to distinguish friendly sonar from other acoustic emissions that may exist as part of the natural undersea environment, or from pings that may have originated from hostile forces, or, from bogus echoes fabricated by the enemy. Marking sonars by identifying signatures, makes it possible to identify or counter fraudulent transmissions. These objectives can all be met if the sonar pulses are embedded with identifying signatures, i.e. watermarks, that are not in headers or separate fields, but as intrinsic fabric of the signal. This work addresses the development of a specific class of watermarking algorithms that are robust in undersea propagation environment.