

# Abstract

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## **High Payload Audio Watermarking using Sparse Coding with Robustness to MP3 Compression**

A high payload audio watermarking technique is proposed based on the compressed sensing and sparse coding framework, with robustness to MP3 128kbps and 64kbps compression attacks. The binary watermark is a sparse vector with one non-zero element that takes a positive negative sign based on the bit value to be encoded. A Gaussian random dictionary maps the sparse watermark to a random watermark embedding vector that is adapted adaptively for each audio frame to maximize robustness to the MP3 attack. At the decoder, the Basis Pursuit Denoising algorithm (BPDN) is used to extract the embedded watermark sign. High payloads of (689, 1378 and 2756) bps are achieved with %BER of (0.3%, 0.5% and 1%) and (0.1%, 0.3% and 0.5%) for 64kbps and 128kbps MP3 compression attacks respectively. The signal to embedding noise ratio is kept in the range of 27-30 dB in all cases. Keywords: Sparse Coding, Compressed Sensing, Audio Watermarking, MP3 Audio, Robust Watermarking, Basis Pursuit Denoising (BPDN).