**ABSTRACT** 

Development of Internet technology in the digital age provides convenience

to exchange information whenever and wherever. However, this convenience also

have a negative impact such as piracy and illegal deployment of the digital data.

Therefore, a solution is needed to give ownership marks of an audio data, one of

solution by using watermarking technique. In terms of data security, this technique

has the major criteria, some of which are transparency, robustness, imperceptibility

and security.

This study was designed a scheme to protect copyright and originality of

audio data. Watermarking technique use based on DWT (Discrete Wavelet

Transform) and QRD (QR Decomposition) than watermark inserted with QIM

(Quantization Index Modulation). After all the watermarking process is completed,

the next will be optimized with *Particle Swarm Optimization* method to each type

of host audio that has the worst BER value. .

The hosts used are guitar, drum, piano, Vocals and bass with the .wav

format. The result of audio watermarking system after the optimization with

Particle Swarm Optimization is better than before optimizing. Optimal parameter

after optimizing which was most resistant to attack is Drums audio (Compression

MP4 32 k) with DWT level 4, n*Frame* 2, nbit 3, threshold 0,0179 and insert position

on all R matrices which produces the value of ODG -2.5174, SNR 22.5417, BER

0, Capacity 5.3833.

**Keywords**: audio watermarking, watermark, DWT, QRD, QIM, Particle Swarm

**Optimization** 

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