

MATHEMATICAL TRANSFORM TECHNIQUE THROUGH THE SOUND WAVES

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This paper contains a encoding of input data into audio signal based transform technique to get original output. In this process data transformed into a distinct frequency using a linear mapping function. These frequencies are synthesized as discrete-time sinusoidal signals and concatenated to form an encrypted audio waveform. In decoding frequency-domain analysis through the Discrete Fourier Transform (DFT) and its computationally efficient variant, the Fast Fourier Transform (FFT). By detecting the dominant frequency present in each time segment, the original prime number and corresponding alphabetic character are accurately recovered. The proposed system integrates number theory, trigonometry, sampling theory, and harmonic analysis, providing an interdisciplinary framework suitable for cryptography education, digital signal processing demonstrations, and mathematical visualization of encryption concepts.

1. Introduction

The cryptographic systems primarily operate in the domain of messages or text strings, in which information is represented through binary sequences, characters, or mathematically constructed keys. While these approaches are highly effective for ensuring secure communication, they often remain abstract and are not directly associated with physical signal representations. Several researchers have contributed significantly to this field. For instance, Fredric J. Harris [1] explored signal-processing-based approaches, while G. Dhanorkar

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