

Crypto Lens: An Advanced Steganography Suite for Secure Data Hiding and Detection

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Abstract: *In the modern digital era, secure communication is essential due to increasing cyber threats and data breaches. This paper presents Crypto Lens: An Advanced Steganography Suite for Secure Data Hiding and Detection, a dual-layer security framework that integrates cryptography and steganography within a unified system.*

The proposed approach encrypts secret data using the Advanced Encryption Standard (AES) with password-based key derivation and ensures data integrity through HMAC with SHA-256. The encrypted content is embedded into image and audio files using the Least Significant Bit (LSB) steganography technique to achieve covert communication with minimal perceptual distortion.

The system supports multiple file formats and is implemented using Python with a graphical user interface built on PySide6 and QML. Experimental results demonstrate that the framework effectively achieves confidentiality, integrity, and hidden data transmission while preserving media quality.

Keywords: Cryptography, Steganography, AES Encryption, HMAC, LSB Technique, Secure Communication, Data Integrity

