

## PROJECT ABSTRACT FORM

**Year:** IV B.TECH – CSE(CIC)

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**Team No:** 8

**Name of the Project Guide:** Mr. O. T. GOPI KRISHNA

**Title of the Project:** A Secure Steganographic Framework using AES-ECC Encryption and Adaptive DWT-DCT Embedding for Covert Communication

### **Abstract:**

This project is inspired by recent advancements in cybersecurity detailed in Research Article **A Secure Fusion: Elliptic Curve Encryption Integrated with LSB Steganography for Hidden Communication** from **International Journal of Computational and Experimental Science and ENgineering (IJCESEN)**. Current research shows a clear trend toward multi-layered security systems that combine robust cryptography with advanced steganography. Specifically, studies demonstrate that integrating strong encryption using **AES, ECC, ACO**.

Existing steganographic systems often use simple LSB (Least Significant Bit) embedding or single transform-domain methods (**DWT or DCT**). While some solutions encrypt the payload using AES, they often rely on fixed or predictable embedding positions, making them vulnerable to modern statistical and deep learning-based steganalysis attacks. The payload capacity in these systems is frequently limited, and their robustness against compression or noise attacks can be weak. Very few systems integrate a complete, high-performance solution that supports both text and file hiding within a real-time communication framework for network environments.

This project addresses the vulnerabilities of traditional steganography by proposing a novel, multi-layered framework for covert communication. Our solution integrates hybrid **AES-ECC** cryptography for robust payload and key encryption with an adaptive, multi-transform steganography engine. To maximize payload, data is first compressed using **Huffman Coding** before being embedded into an image's **DWT-DCT** frequency domain, with embedding locations intelligently selected by **Ant Colony Optimization (ACO)** or chaotic maps to resist steganalysis. The system is designed as a secure chat and file transfer application for Windows LANs, targeting a high payload capacity (**30–50%**) while ensuring exceptional imperceptibility (**PSNR > 50dB**) and robustness (**high NPCR/UACI**).

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