

# DIGITAL STEGANOGRAPHY

DIGITAL STEGANOGRAPHY USING PYTHON





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# AGENDA

WHAT IS STEGANOGRAPHY?

PROJECT OVERVIEW

CODEBASE STRUCTURE

IMAGE STEGANOGRAPHY

AUDIO STEGANOGRAPHY

VIDEO STEGANOGRAPHY

SECURITY FEATURES

COMMAND LINE INTERFACE

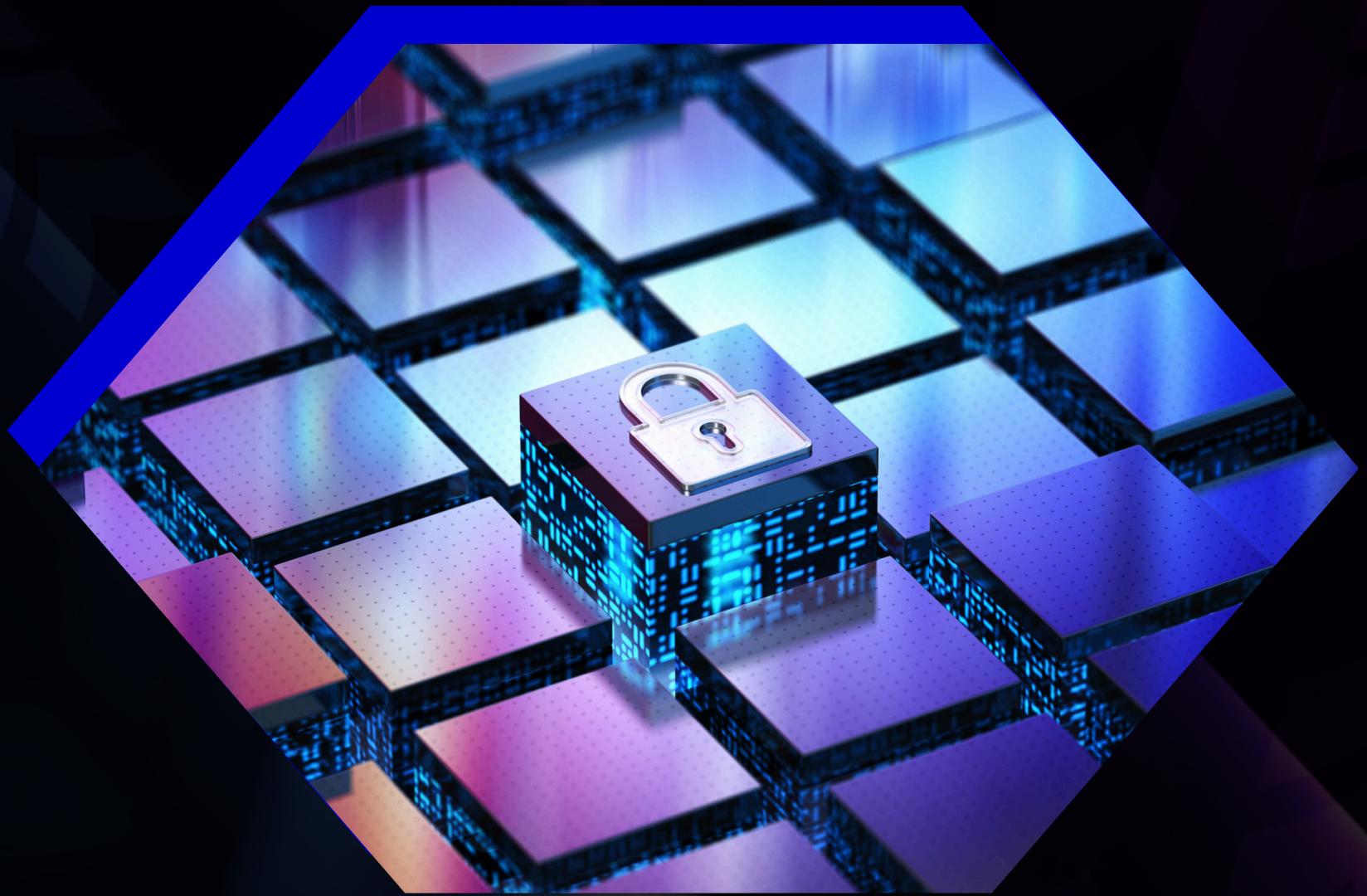
CONCLUSION

REFERENCES



# WHAT IS STEGANOGRAPHY?

- The art and science of **hiding information** within other non-suspicious data.
- Unlike cryptography, steganography **hides the existence** of the message.
- **Modern applications:** images, audio, video, network protocols.



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# PROJECT OVERVIEW

- Implemented using Python to Hide and extracts data from Images, Audio files and Video files by using Techniques: LSB (Least Significant Bit), DCT (Discrete Cosine Transform) and Echo Hiding

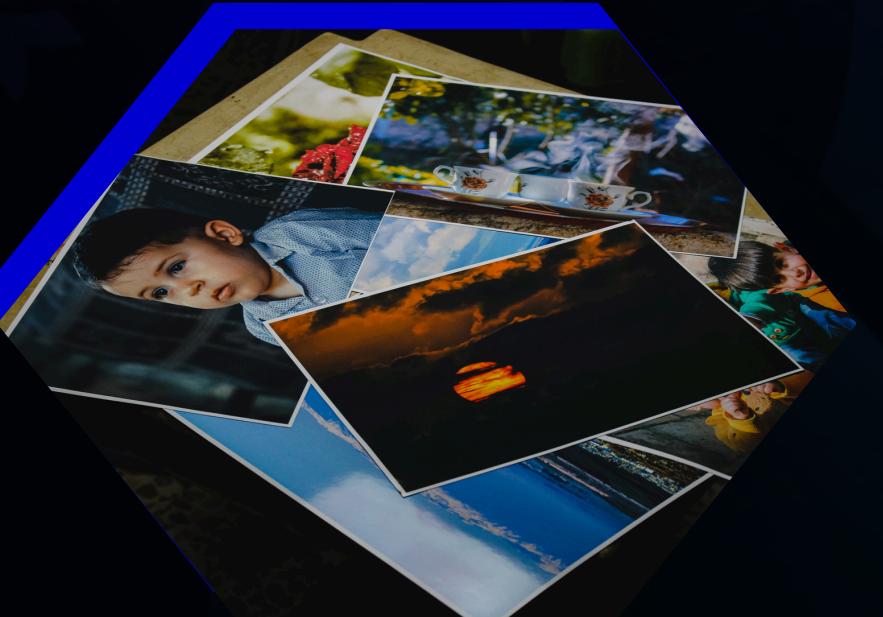


IMAGE  
STEGANOGRAPHY



AUDIO  
STEGANOGRAPHY



VIDEO  
STEGANOGRAPHY

# CODEBASE STRUCTURE



## CRYPTO.PY

Encryption and conversion utilities.

## IMAGE\_STEGO.PY

Image hiding/extracting methods.

## AUDIO\_STEGO.PY

Audio hiding/extracting methods.

## VIDEO\_STEGO.PY

Video hiding/extracting methods.

# IMAGE STEGANOGRAPHY



## 1-LSB METHOD:

- Modifies the least significant bits of RGB pixels.
- High capacity, low visual distortion.

## 2-DCT METHOD:

- Modifies frequency domain (DCT coefficients).
- More robust against compression.

# AUDIO STEGANOGRAPHY



## 1-LSB METHOD:

- Changes least significant bit of audio samples.
- High capacity but detectable.

## 2-ECHO HIDING:

- Embeds data via small echo delays.
- Better resistance to analysis.

# VIDEO STEGANOGRAPHY

## 1-LSB METHOD:

- Embeds characters frame-by-frame using LSB.
- Metadata stored in the first frame.
- Audio is preserved.





# SECURITY FEATURES



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## ENCRYPTION:

- Messages encrypted with password (Fernet + SHA-256 key).

## DELIMITERS:

- Pattern marks end of the message (e.g., 1111111111111110).

## PASSWORD PROTECTION:

- Required for both embedding and extraction.

# COMMAND LINE INTERFACE

- Easy access via terminal commands.
- ```
python main.py hide image lsb input.png output.png "Hello" --password mypass
```
- ```
python main.py extract image lsb output.png --password mypass
```



# CONCLUSION

- Strong educational tool for understanding digital steganography.
- Modular design allows easy extension.
- Suitable for learning, but more protection needed for high-security use cases.





# REFERENCES

TAYLOR & FRANCIS – STEGANOGRAPHY

IEEE XPLORER – DIGITAL STEGANOGRAPHY

GEEKSFORGEEKS – STEGANOGRAPHY

EDUREKA – STEGANOGRAPHY TUTORIAL

MEDIUM – VIDEO STEGANOGRAPHY WITH PYTHON



THANK YOU