



OVIDIUS UNIVERSITY OF  
CONSTANTA

# STEGANOGRAPHY TECHNIQUES APPLIED ON THE INFORMATIONAL NETWORKS

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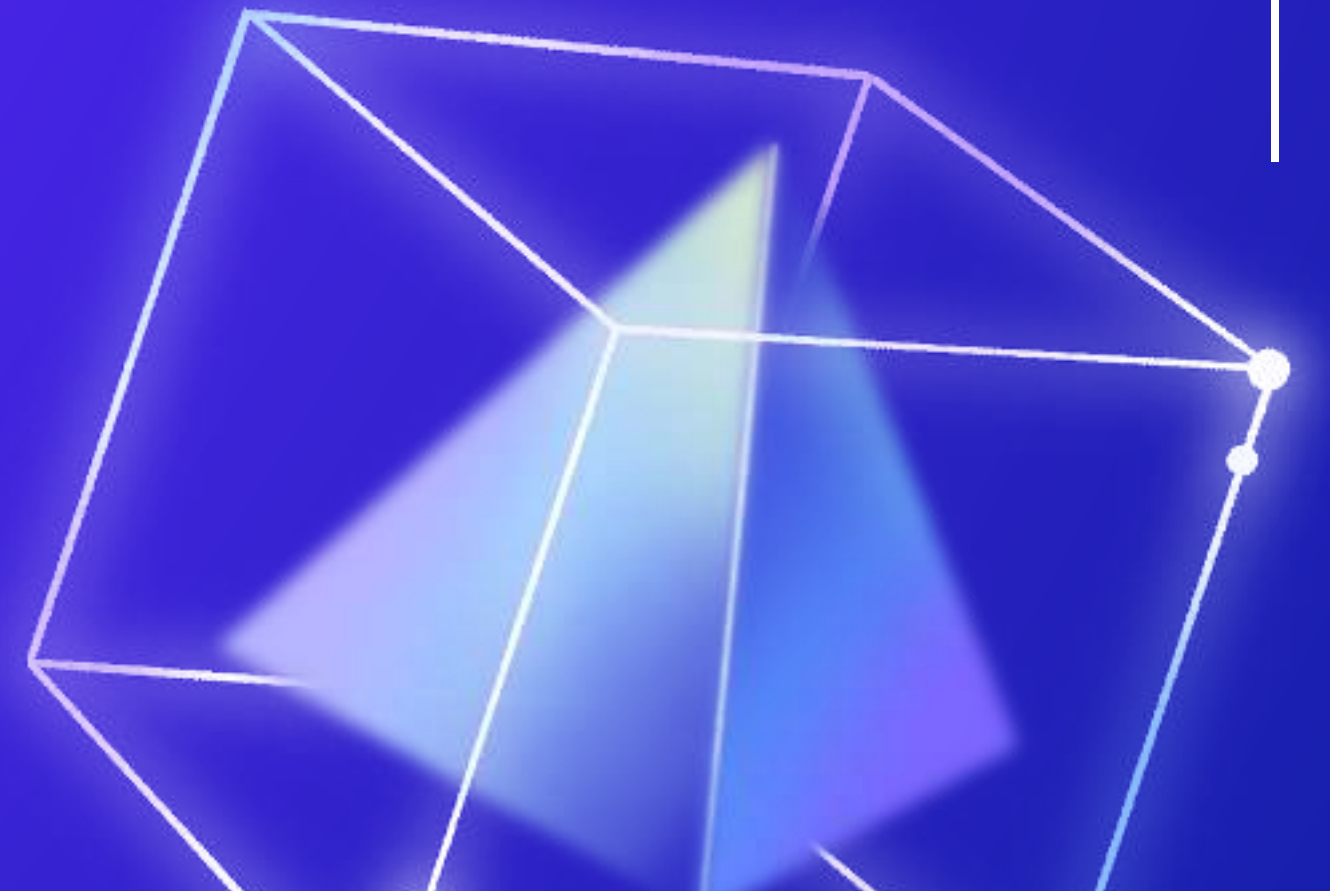
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# INTRODUCTION

Purpose:

- give an insight into steganography, based on the cybersecurity domain
- present the InkOnPixels software, that has the purpose to showcase the applicability of the steganography principles in a day-to-day context



# STEGANOGRAPHY

## Definition

To summarize, steganography techniques involve hiding sensitive data in files such as images, audio files or text documents. This way, it ensures the confidentiality and privacy of the transmitted data, serving as a fundamental requirement in the modern cybersecurity world.



# STEGANOGRAPHY TECHNIQUES

## ~IMAGE STEGANOGRAPHY~

Refers to embedding information within digital pictures, without altering their appearance

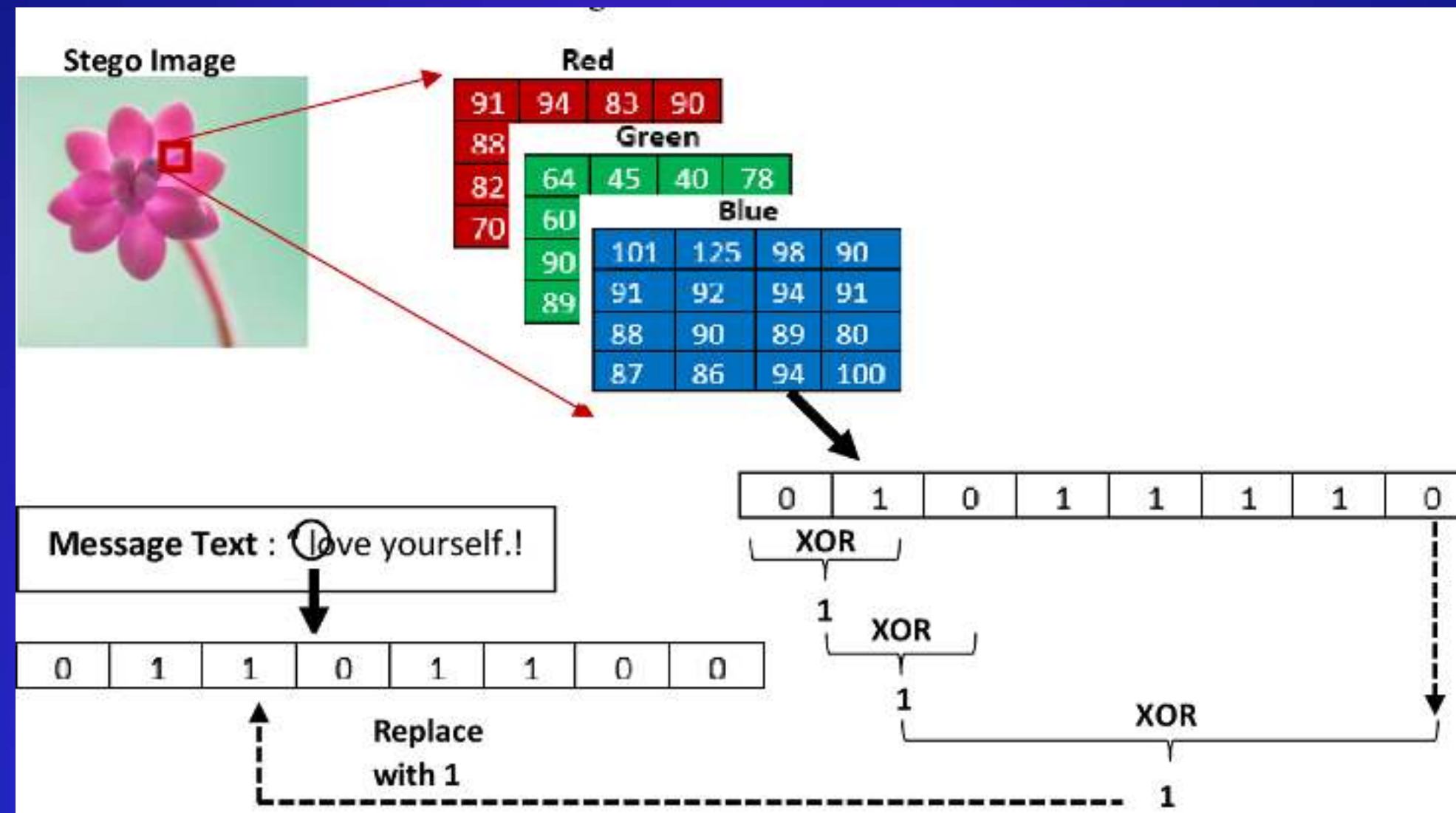


Figure 1 - LSB Method

# STEGANOGRAPHY TECHNIQUES

## ~AUDIO STEGANOGRAPHY~

Refers to hiding information in the audio signals

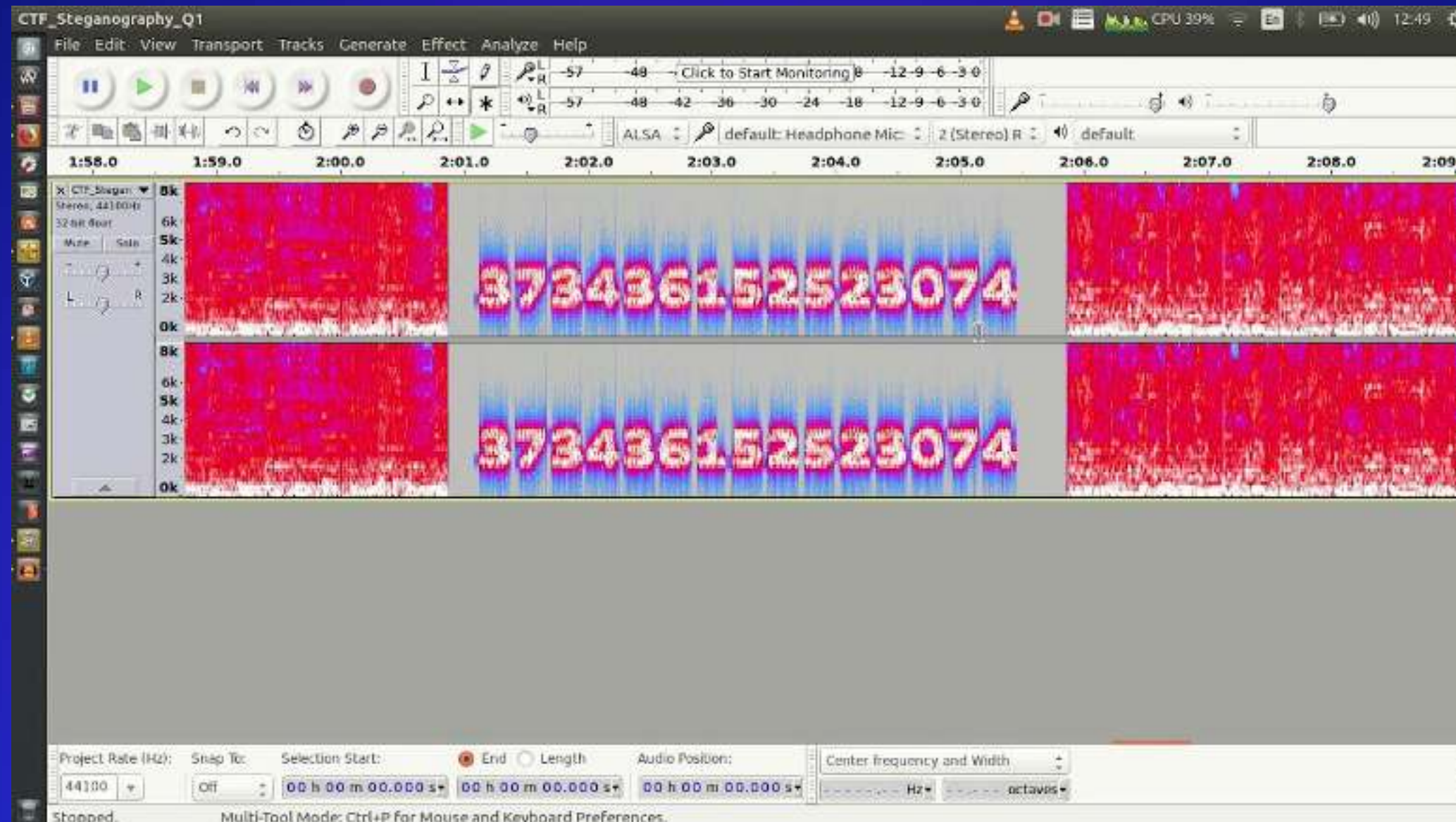


Figure 2- Spectrum encoding

# STEGANOGRAPHY TECHNIQUES

## ~TEXT STEGANOGRAPHY~

Refers to hiding information in text documents or messages, often by modifying whitespaces, punctuation or formatting elements

Hidden messages could also appear in the form of miniscule typeface, size, or spacing differences. Extra spaces before certain words could indicate that those words or the first letters of those words should be taken apart from the entire message to reveal a secret embedded utterance. This is especially handy in html files since extra spaces show up only in the source file and not on the webpage display. Letters that are slightly larger might similarly be taken to reveal a hidden message. It could even be that, through use of invisible ink between lines of text or tiny print within underlining or punctuation, the true message is not visible at all. Some of these methods may be easier to detect than others, but they have had their own practical uses in history, as we will saw in the previous section. Can you find the message hidden in this paragraph?

answer: MADE IT OUT SEND MONEY

**Figure 2- Formatting method**

# WHY DO WE NEED STEGANOGRAPHY?

Steganography is a good measure against unwanted access and interception of the transmitted data.

By embedding information in files, it allows us to create secure communication channels.

Moreover, steganography can be enhanced as a technique with encryption techniques, this way fortifying the confidentiality and integrity of the digital assets.



# REQ



## IMPERCEPTIBILITY

The first fundamental principle would be imperceptibility, which is the need to conceal data within a carrier item to make it undetectable to human observers

## CAPACITY

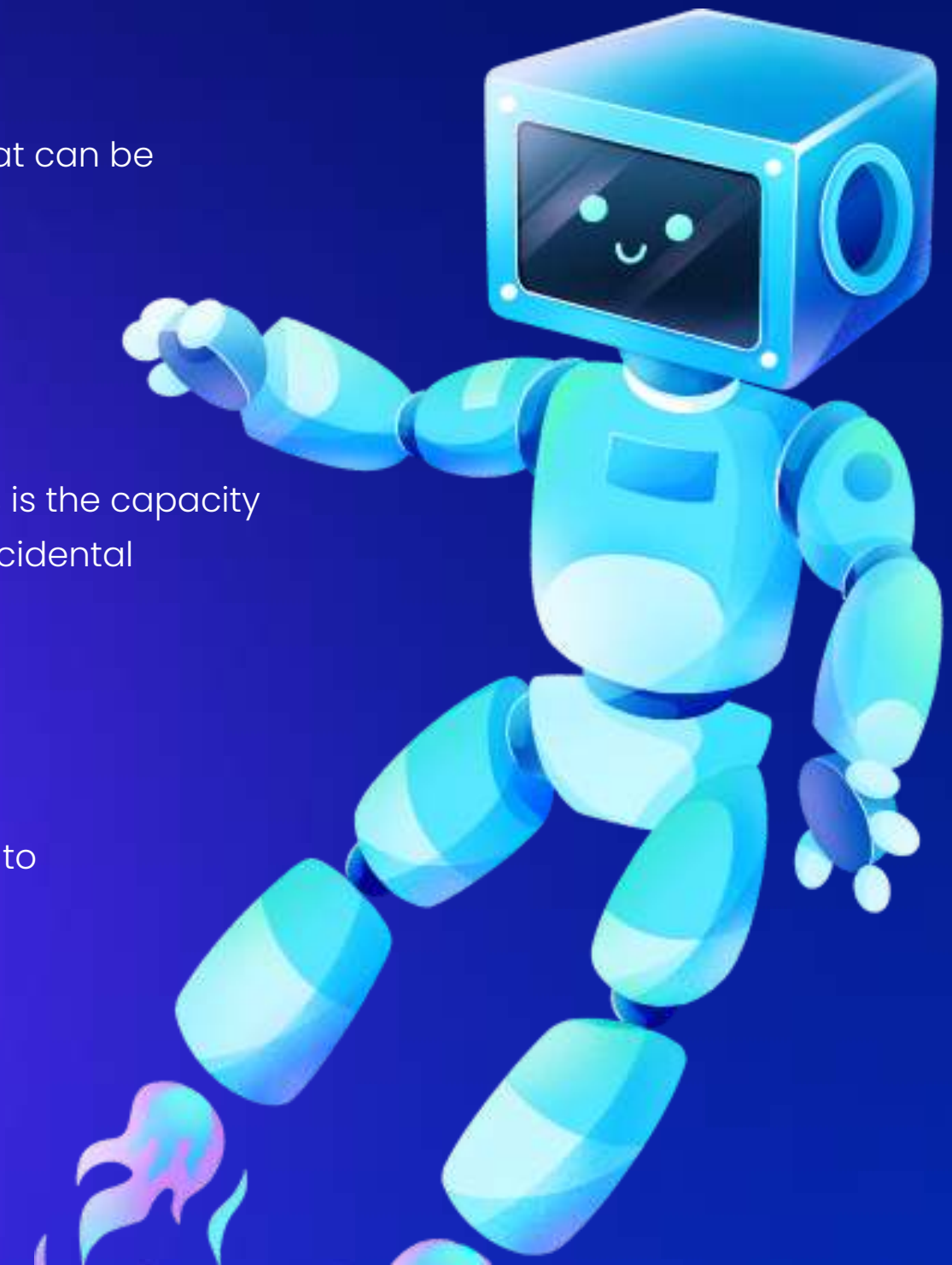
Refers to the amount of information that can be embedded in a file, without altering it

## ROBUSTNESS

In steganographic systems, robustness is the capacity of the system to resist intentional or accidental modifications to the carrier item

## SECURITY

The carries must resist to the attackers' attempts to steal private information without permission.




INKONPIXELS



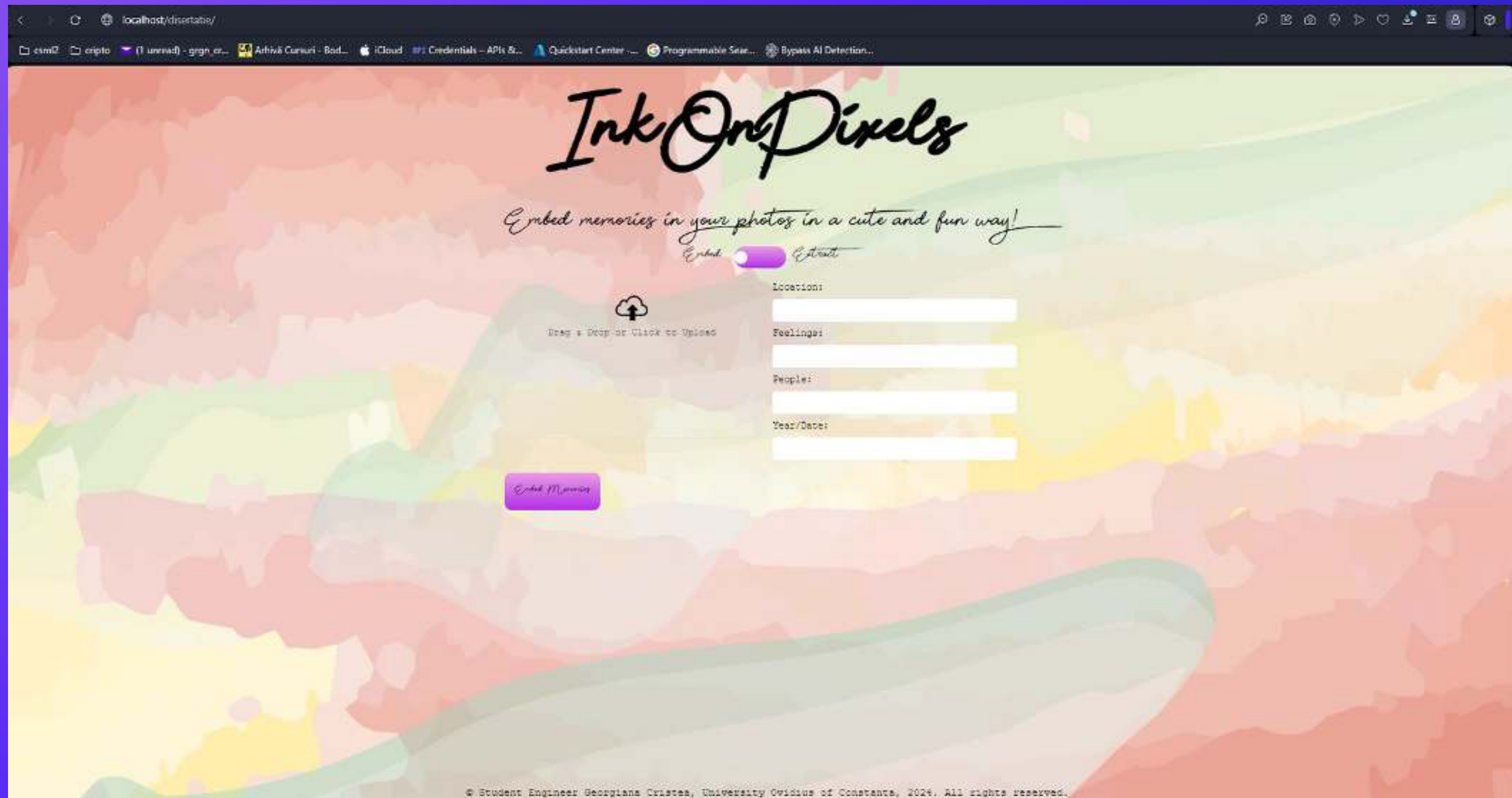


# DESCRIPTION

InkOnPixel is a web application that was developed in order to demonstrate the use of steganography in a cool and fun way, by allowing the user to embed metadata such as location, feelings, people and date in pictures. It also provides the option to extract this information from the pictures that were specifically embedded within the application. One can think of it as a modern way to encompass information in pictures, like people used to do back in time, when they were writing all this information on the back of the picture



# INTERFACE





# TECHNOLOGIES

Web server – XAMPP

Frontend – HTML & CSS

Backend – PHP, JS, Python



LET'S OPEN THE APP TO SEE  
SOME OF ITS  
FUNCTIONALITIES!



# CONCLUSIONS



## CONCLUSION 01

Despite its numerous advantages, the implementation of steganography techniques presents a significant number of challenges.



## CONCLUSION 02

In terms of limitations, InkOnPixels in its current version, is limited to only image steganography. Moreover, the only technique implemented for embedding and extracting data is LSB.



## CONCLUSION 03

The main objective of this paper was to showcase both the theoretical side of steganography, and the practical applications of steganography in day-to-day life, in a way that differs from the academical environment

THANK YOU!

