

A
Major Project
On
**SECURE DATA TRANSFER THROUGH INTERNET USING
CRYPTOGRAPHY AND IMAGE STEGANOGRAPHY**
(Submitted in partial fulfillment of the requirements for the award of Degree)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
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CERTIFICATE

This is to certify that the project entitled **“SECURE DATA TRANSFER THROUGH INTERNET USING CRYPTOGRAPHY AND IMAGE STEGANOGRAPHY”** being submitted by **T.PRANAY REDDY(197R1A05H1), S.NIKITHA(197R1A05G4) & S.AKHILA(197R1A05G7)** in partial fulfillment of the requirements for the award of the degree of B.Tech in Computer Science and Engineering to the Jawaharlal Nehru Technological University Hyderabad, is a record of bonafide work carried out by them under our guidance and supervision during the year 2022-23.

The results embodied in this thesis have not been submitted to any other University Or Institute for the award of any degree or diploma.

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ABSTRACT

Internet of Things (IoT) is a domain where in which the transfer of data is taking place every single second. The security of these data is a challenging task; however, security challenges can be mitigated with cryptography and steganography techniques. These techniques are crucial when dealing with user authentication and data privacy. A cryptography technique is used to encrypt confidential data that came from different medical sources. Next, a Matrix XOR encoding steganography technique is used to embed the encrypted data into a low complexity image. Finally, the data that is hidden in the image is recovered and is then decrypted. There is no effective secret key used for data hiding. Less security cryptographic techniques have been used. It uses software virtualization and assembly level code verification to provide memory isolation and custom security presented energy-efficient. A lower energy variant datagram transport layer security (DTLS) that had the security strength but a lower energy requirement. There is no effective secret key used for data hiding. Less security cryptographic techniques have been used. This technique to hide the data inside an image is called image steganography. Humans cannot make a difference in the image when the data is embedded in it. It takes quite knowledge and tool practice to identify the image. We are using cryptography and steganography to provide high security to the data over the internet. The encoded secret message is inserted within the image by the XOR steganography technique.

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1. INTRODUCTION

1.1 PROJECT SCOPE

This application hides data or information inside images (in a process called steganography) using Bitmap image (.bmp format) or JPG(.jpg) or gif format as its carrier file. However; Only texts can be hid using this method; while other data forms may not work with it. Password have to be shared which can be hacked and used. Have to manually send the image to receiver.

1.2 PROJECT PURPOSE

The purpose of this project work is to develop a system that will implement steganography using image which serve as security measure by hidden the most of the communication to cover a message from third party. The objectives of the study are highlighted as below to carry out a critical review of the concept of information security to carry out a thorough survey of the various steganography types we have to carry out an elaborate investigation into image steganography.

1.3 PROJECT FEATURES

Steganography is a method of hiding secret data, by embedding it into an audio, video, image, or text file. It is one of the methods employed to protect secret or sensitive data from malicious attacks. cryptography makes the data unreadable, or hides the meaning of the data, while steganography hides the existence of the data. cryptography is similar to writing a letter in a secret language: people can read it, but won't understand what it means. However, the existence of a (probably secret) message would be obvious to anyone who sees the letter, and if someone either knows or figures out your secret language, then your message can easily be read. If you were to use steganography in the same situation, you would hide the letter inside a pair of socks that you would be gifting the intended recipient of the letter.

Similarly, if two users exchanged media files over the internet, it would be more difficult to determine whether these files contain hidden messages. Cryptography is often used to supplement the security offered by steganography. Cryptography algorithms are used to encrypt secret data before embedding it into cover files. To improve the effectiveness of the system, it is important to consider other types of steganography methods that can hide different types of data, such as audio or video files. Additionally, the use of strong encryption algorithms can improve the security of the system by ensuring that the hidden data remains secure even if the password is compromised. Overall, the concept of steganography has great potential as a security measure, but it is important to consider the limitations and to implement appropriate measures to address them.

Interconnected computers have become an integral part of people's lives and daily routines. Unfortunately, terrorists have recognized the internet's vulnerability and have taken advantage of it as a potential platform for attacks. To safeguard information and computer systems, security measures have been developed to prevent unauthorized access, theft, destruction, or disclosure of data. Confidentiality is crucial since computer usage is typically restricted to a limited number of users, and information can be exposed by hackers, viruses, and worms. Thus, security can be defined as the degree of resistance to, or protection from, harm, which has evolved over time. Steganography, an ancient art and modern science of hidden communication, involves concealing the existence of a message, while cryptography, the art and science of secret communication, introduces secrecy into data and information security by hiding messages using techniques such as encryption. Both cryptography and steganography can be used to provide security to data, but each has its limitations. The issue with cryptography is that the encrypted text may appear meaningless, causing the attacker to become suspicious and scrutinize the information more carefully.

2. SYSTEM ANALYSIS

It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. Analysis is the process of breaking a complex topic or substance into smaller parts in order to gain a better understanding of it. The technique has been applied in the study of mathematics and logic since before Aristotle (384-322B.C.), though analysis as a formal concept is a relatively recent development. There are many types of analysis:

Requirement analysis: encompasses those tasks that go into determining the needs or conditions to meet for new or altered product, taking account of the possibly conflicting requirements of the various stakeholders, such as beneficiaries or users.

Competitive analysis: shows how online algorithms perform and demonstrates the power of randomization in algorithms.

Lexical analysis: the process of processing an input sequence of characters and producing as output a sequence of symbols.

Object-oriented analysis and design: is a popular technical approach for analyzing and designing an application, system, or business by applying object oriented programming, as well as using visual modelling throughout the development life cycles to foster better stakeholder communication and product quality.

Program analysis: the process of automatically analyzing the behavior of computer programs.

Semantic analysis: a pass by a compiler that adds semantical information to the parse tree and performs certain checks.

Static code analysis: the analysis of computer software that is performed without actually executing programs built from that.

Syntax analysis: a process in compilers that recognizes the structure of programming languages, also known as parsing.

Worst-case execution time: Determines the longest time that a piece of software can take to run. System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem-solving technique that improves the system and ensures that all the components of the system work efficiently.

2.1 EXISTING SYSTEM:

There is no effective secret key used for data hiding. Less security cryptographic techniques have been used. It uses software virtualization and assembly level code verification to provide memory isolation and custom security presented energy- efficient. A lower energy variant datagram transport layer security (DTLS) that had thesecurity strength but a lower energy requirement.

2.1.1 DISADVANTAGES:

- There is no effective secret key used for data hiding.
- Less security cryptographic techniques have been used.
- It needed a lot of overhead to hide associatively few bits of information.

2.2 PROPOSED SYSTEM:

This technique to hide the data inside an image is called image steganography. Humans cannot make a difference in the image when the data is embedded in it.

It takes quit knowledge and tool practice to identify the image. We are using cryptography and steganography to provide high security to the data over the internet. The encoded secret message is inserted with in the image by the XOR steganography technique.

2.2.1 ADVANTAGES

All the fireflies are unisex so that all fireflies are attracted to each other. Attractiveness between the fireflies is proportional to their brightness; thus, a less bright firefly will move toward a brighter one. With increased distance between fireflies, both the attractiveness and brightness decrease. The brightness of a firefly is determined by the landscape of the objective function. Two important issues persist in the Firefly algorithm:

- a) Formulation of the attractiveness and
- b) The variation of light intensity.

2.3 SYSTEM FEASIBILITY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for three key considerations involved in the feasibility analysis are:

- ♦ ECONOMICAL FEASIBILITY
- ♦ TECHNICAL FEASIBILITY
- ♦ SOCIAL FEASIBILITY

2.3.1 ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

2.3.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes .

2.3.3 SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system, the system is essential.

2.4 SYSTEM SPECIFICATIONS

HARDWARE AND SOFTWARE REQUIREMENTS

System requirements are all of the requirements at the system level that describe the functions which the system as a whole should fulfill to satisfy the stakeholder needs and requirements, and are expressed in an appropriate combination of textual statements, views, and non-functional requirements; the latter expressing the levels of safety, security, reliability, etc., that will be necessary.

2.4.1 SOFTWARE REQUIREMENTS:

The functional requirements or the overall description documents include the product perspective and features, operating system and operating environment, graphics requirements, design constraints and user documentation. The appropriation of requirements and implementation constraints gives the general overview of the project in regards to what the areas of strength and deficit are and how to tackle them.

Python IDLE 3.7

SQL Lite

Visual Studio Code

2.4.2 HARDWARE REQUIREMENTS:

Minimum hardware requirements are very dependent on the particular software being developed by a given Enthought Python / Canopy / VS Code user. Applications that need to store large arrays/objects in memory will require more RAM, whereas applications that need to perform numerous calculations or tasks more quickly will require a faster processor.

Operating system	: Windows 10
Processor	: Intel i3
Ram	: Minimum 4GB
Hard disk	: Minimum 250GB

3. SYSTEM DESIGN

System design is transition from a user-oriented document to programmers or data base personnel. The design is a solution, how to approach to the creation of a new system. This is composed of several steps. It provides the understanding and procedural details necessary for implementing the system recommended in the feasibility study. Designing goes through logical and physical stages of development, logical design reviews the present physical system, prepare input and output specification, details of implementation plan and prepare a logical design walkthrough.

The database tables are designed by analyzing functions involved in the system and format of the fields is also designed. The fields in the database tables should define their role in the system. The unnecessary fields should be avoided because it affects the storage areas of the system. Then in the input and output screen design, the design should be made user friendly. The menu should be precise and compact.

3.1 SOFTWARE DESIGN:

In designing the software following principles are followed:

Modularity and partitioning: software is designed such that, each system should consist of hierarchy of modules and serve to partition into separate function.

Coupling: modules should have little dependence on other modules of a system.

Cohesion: modules should carry out in a single processing function.

Shared use: avoid duplication by allowing a single module be called by other that need the function it provides.

3.2 INPUT AND OUTPUT DESIGN:

Input design:

Considering the requirements, procedures to collect the necessary input data in most efficiently designed. The input design has been done keeping in view that, the interaction of the user with the system being the most effective and simplified way.

Also, the measures are taken for the following:

- Controlling the amount of input.
- Avoid unauthorized access to the classroom.
- Eliminating extra steps.
- Keeping the process simple.
- At this stage the input forms and screens are designed.

Output design:

All the screens of the system are designed with a view to provide the user with easy operations in simpler and efficient way, minimum key strokes possible. Instructions and important information is emphasized on the screen. Almost every screen is provided with no error and important messages and option selection facilitates. Emphasis is given for speedy processing and speedy transaction between the screens. Each screen assigned to make it as much user friendly as possible by using interactive procedures. So to say user can operate the system .

4. ARCHITECTURE

4.1 SYSTEM ARCHITECTURE:

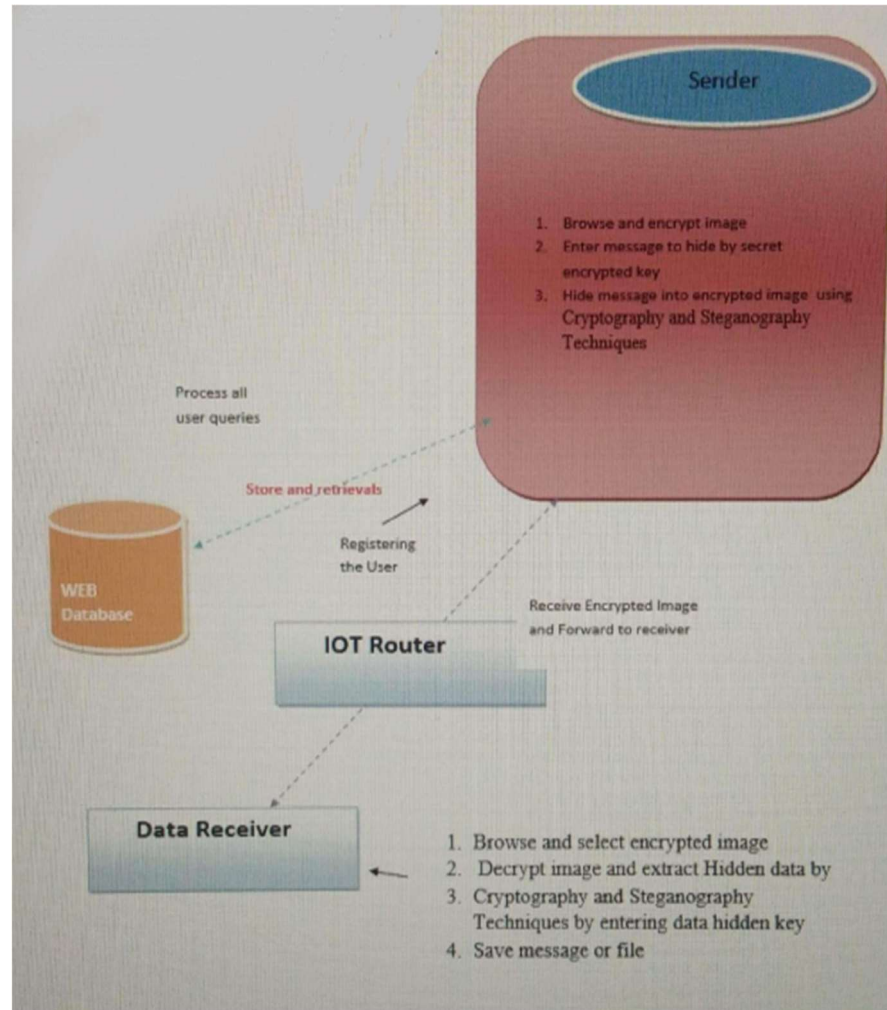


Figure 4.1 : System Architecture

4.1.1 DATA FLOW DIAGRAM:

The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system. The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system. DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output. DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

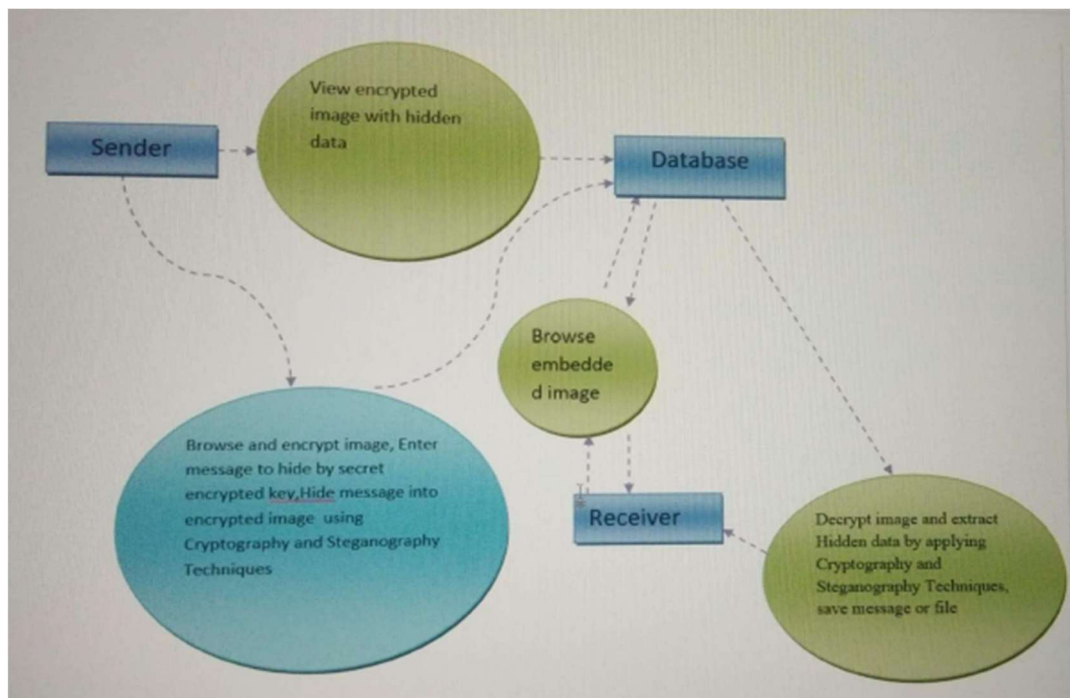


Figure 4.1.1 : Data Flow Diagram

4.2 UML DIAGRAMS:

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group. The goal is for UML to become a common language for creating models of object-oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML. The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non- software systems. The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems. The UML is a very important part of developing object-oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

GOALS:

The Primary goals in the design of the UML are as follows:

Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.

- Provide extendibility and specialization mechanisms to extend the core concepts.
- Be independent of particular programming languages and development process.
- Provide a formal basis for understanding the modeling language.

4.2.1 USE CASE DIAGRAM:

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted. A use case diagram is a graphic depiction of the interactions among the elements of a system. A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. The use cases, which are specific roles played by the actors within and around the system. Use case diagrams are typically develop in early stage of development and people often apply use case modeling for the following purposes:

- Specify the context of a system
- Capture the requirements of a system
- Validate a systems architecture

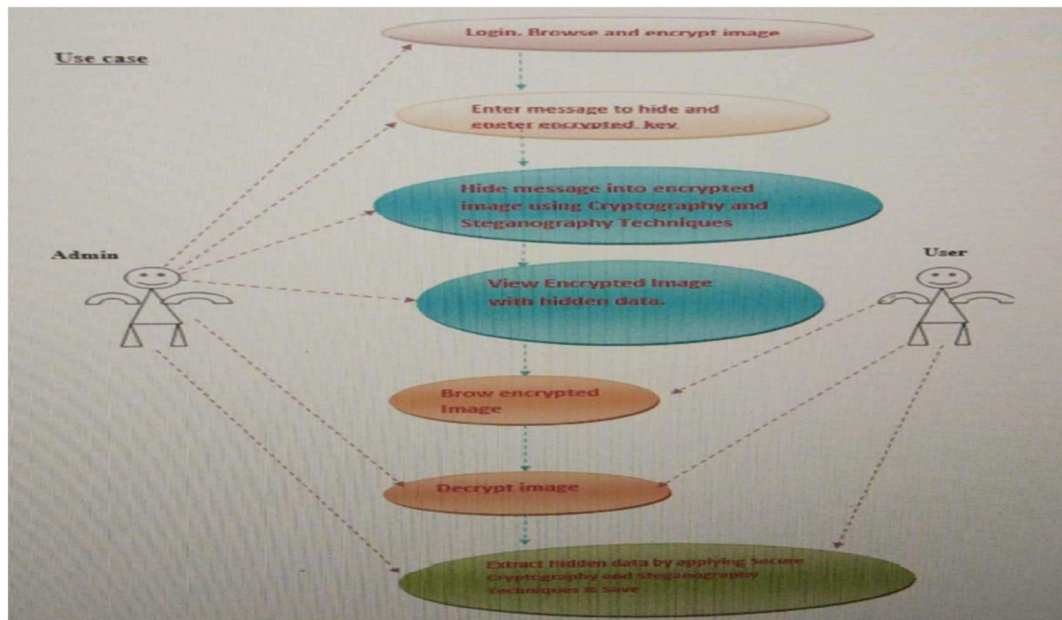


Figure 4.2.1 Use Case Diagram

4.2.2 SEQUENCE DIAGRAM:

A sequence diagram represents the interaction between different objects in the system. The important aspect of a sequence diagram is that it is time-ordered. This means that the exact sequence of the interactions between the objects is represented step by step. Different objects in the sequence diagram interact with each other by passing "messages". A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

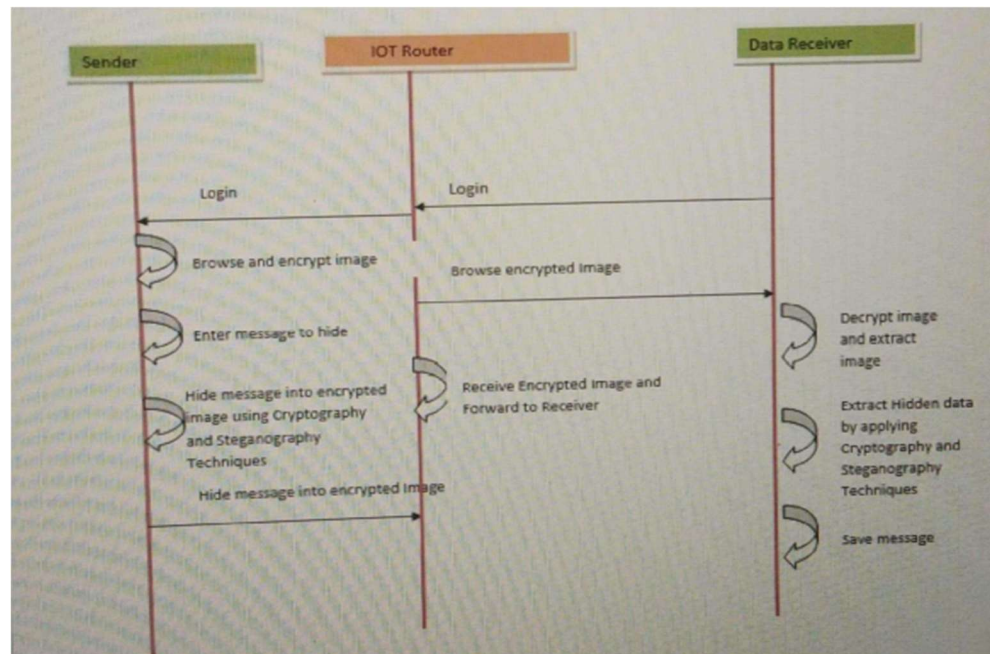


Figure 4.2.2 Sequence Diagram

4.2.3 CLASS DIAGRAM :

The class diagram is used to refine the use case diagram and define a detailed design of the system. The class diagram classifies the actors defined in the use case diagram into a set of interrelated classes. The relationship or association between the classes can be either an "is-a" or "has-a" relationship. Each class in the class diagram may be capable of providing certain functionalities. These functionalities provided by the class are termed "methods" of the class. Apart from this, each class may have certain "attributes" that uniquely identify the class.

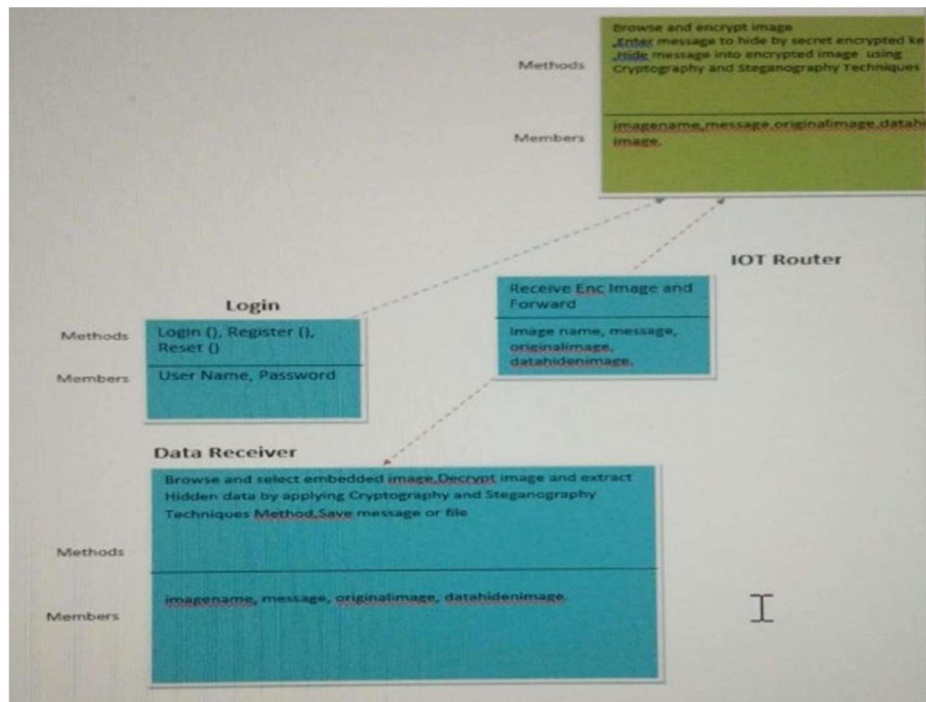


Figure 4.2.3 Class Diagram

4.2.4 FLOW CHART DIAGRAM :

A flowchart is a type of diagram that represents a workflow or process. A flowchart can also be defined as a diagrammatic representation of an algorithm, a step-by-step approach to solving a task. The flowchart shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows.

USER FLOW CHART

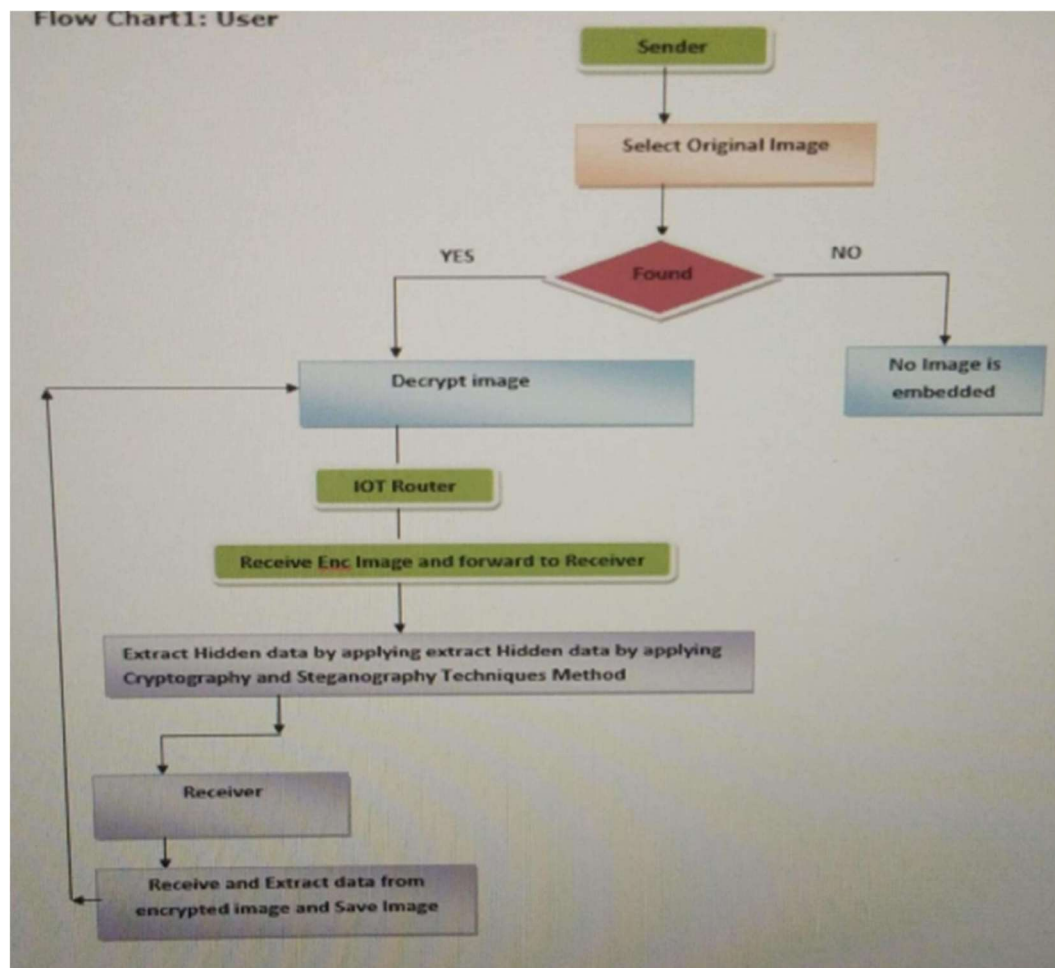


Figure 4.2.4 User Flow Chart

4.2.5 ADMIN FLOW CHART:

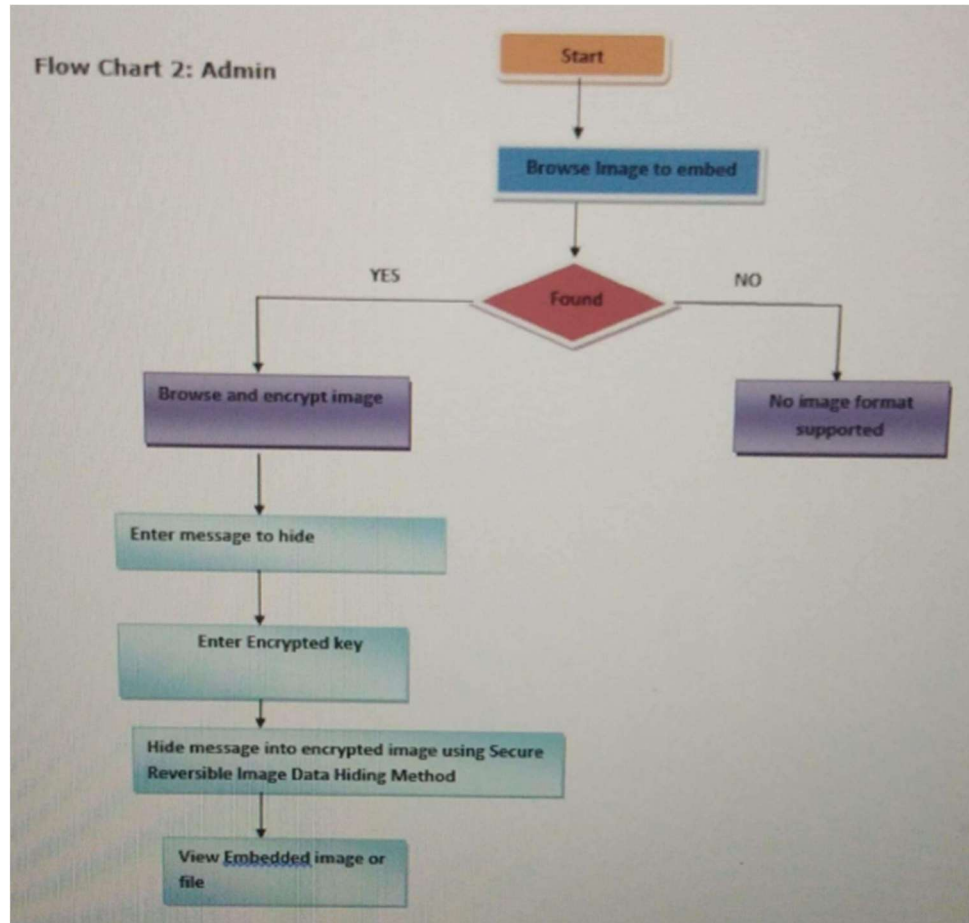


Figure 4.2.5 Admin Flow Chart

5. IMPLEMENTATION

CODE:

```
import numpy

from numpy import asarray

from PIL import Image, ImageOps

def hide(pixel, msg):

    #8 bit Slicing

    bno='{:08b}'.format(pixel) #pixel value to 8 bit binary

    #print(bno)

    no=bno[:-1]+msg # Replacing the LSB with the data bit to be encoded

    #print(no)

    #Converting number from binary to integer

    ans= int(no,2)

    #print(ans)

    return ans

def unhide(pixel):

    #bno='{:08b}'.format(pixel)

    bno= bin(pixel)

    return bno[-1]

def BinaryToDecimal(binary):

    binary1 = binary

    CMRTC
```

```

decimal, i, n = 0, 0, 0

while(binary != 0):

    dec = binary % 10

    decimal = decimal + dec * pow(2, i)

    binary = binary//10

    i += 1

return (decimal)

def encode(image1,msg):

    image1=image1.convert('RGB')

    mywidth = 256

    wpercent = (mywidth/float(image1.size[0]))

    hsize = int((float(image1.size[1])*float(wpercent)))

    image1 = image1.resize((mywidth,hsize))

    r,c=image1.size[0],image1.size[1]

    data=asarray(image1)

    print(data)

    #print(data)

    #Covert to list

    data1=data.tolist()

    #print(data1)

    #image2.show()

```

```

#Add a key to the message

msg = "wearempstmemomoteam"+msg+"$$$"

x=""

for i in msg:

    x+=format(ord(i), '08b') #Convert String -> Charectors -> ASCII -> 8bit
binary

x=str(x) #String of binary

#print(x)

arr = data1 #Copy of image array

#print(len(data1))

ctr=0 #Counter till length of data (Message)

#Traverse the image

for i in range(c-1):

    for j in range(r-1):

        if ctr<len(x):

            try:

                arr[i][j][0]=hide(data1[i][j][0],x[ctr]) #Hide message in the pixel

                ctr+=1

            except:

                print(i,j)

                break

image_arr=numpy.array(arr).astype(numpy.uint8)

#print(image_arr)

image_arr2=Image.fromarray(image_arr)

```

```
#image_arr2=image_arr2.save('imgdemo.png')
```

```
#image_arr2.show()
```

```
return image_arr2
```

```
#.....Decryption.....#
```

```
def decode(img):
```

```
if(img.size[0]==256 or img.size[1]==256 or img.size[0]==257 or
    img.size[1]==257):
```

```
    r,c=img.size[0],img.size[1]
```

```
    data=asarray(img)
```

```
    data1=data.tolist()
```

```
    #print(r,c)
```

```
    output=""
```

```
    y=""
```

```
    for i in 'wearempstmemomoteam':
```

```
        y+=format(ord(i), '08b')
```

```
    n=len(y)
```

```
    ctr=0
```

```
    flag= 'encrypted'
```

```
    for i in range(c-1):
```

```
        if flag!='encrypted':
```

```
            break
```

```
    for j in range(r-1):
```

```

if c<n:

    try:

        if data1[i][j][0]!= int(y[ctr]) and i!=0 and j!=0:

            flag='not enc'

            print(i,j)

            break

    except:

        print(i,j)

        pass

elif ctr==n:

    flag='enc'

    break

ctr+=1

if(flag=='encrypted' or flag=='enc'):

    #print(output)

    y=""

    for i in '$$$':

        y+=format(ord(i), '08b')

    for i in range(c-1):

        for j in range(r-1):

            try:

                if y in output:

                    flag=True

```



```

        break

    else:

        output+=unhide(data1[i][j][0])

    except:

        print(i,j)
        #print(output)

    str_data = ' '

    for i in range(0, len(output), 8):

        temp_data = int(output[i:i + 8])

        decimal_data = BinaryToDecimal(temp_data)

        str_data = str_data + chr(decimal_data)

        return str_data[(len("wearempstmemomoteam")+1):-3].strip()

    else:

        print(flag)

        return "There is no message in the image or the image has been modified [Try
a
different image]"

    else:

        return "There is no message in the image or the image has been modified"

def decrypt(img):

    return decode(img)

from model import encode,decrypt

import numpy

from numpy import as array

from PIL import Image,ImageOps

```

```
import os

from flask import Flask, flash, request, redirect, url_for, send_from_directory,
render_template, send_file

from werkzeug.utils import secure_filename

import sqlite3

UPLOAD_FOLDER = os.path.dirname(os.path.abspath(__file__)) + '/uploads/'

ALLOWED_EXTENSIONS = {'png', 'jpg', 'jpeg', 'gif'}

app = Flask(__name__)

app.config['UPLOAD_FOLDER'] = UPLOAD_FOLDER

def allowed_file(filename):

    return '.' in filename and \

        filename.rsplit('.', 1)[1].lower() in ALLOWED_EXTENSIONS

@app.route('/')

def home():

    return render_template('home.html')

@app.route('/logon')

def logon():

    return render_template('signup.html')

@app.route('/login')

def login():

    return render_template('signin.html')

@app.route("/signup")
```

```
def signup():

    username = request.args.get('user',"")

    name = request.args.get('name',"")

    email = request.args.get('email',"")

    number = request.args.get('mobile',"")

    password = request.args.get('password',"")

    con = sqlite3.connect('signup.db')

    cur = con.cursor()

    cur.execute("insert into `info` (`user`,`email`,`password`,`mobile`,`name`)
VALUES (?, ?,
?, ?, ?)",(username,email,password,number,name))

    con.commit()

    con.close()

    return render_template("signin.html")

@app.route("/signin")

def signin():

    mail1 = request.args.get('user',"")

    password1 = request.args.get('password',"")

    con = sqlite3.connect('signup.db')

    cur = con.cursor()

    cur.execute("select `user`,`password` from info where `user` = ? AND
`password` =
```

```
?",(mail1,password1,))

data = cur.fetchone()

if data == None:

    return render_template("signin.html")

elif mail1 == 'admin' and password1 == 'admin':

    return render_template("intro.html")

elif mail1 == str(data[0]) and password1 == str(data[1]):

    return render_template("intro.html")

else:

    return render_template("signup.html")

@app.route('/index', methods=['GET', 'POST'])

def index():

    if request.method == 'POST':

        # check if the post request has the file part

        if 'file' not in request.files:

            flash('No file part')

            return 'No file part'

        file = request.files['file']

        if file.filename == "":

            return render_template('index.html', error='No image uploaded!')

        if file and allowed_file(file.filename):

            file.save(os.path.join(app.config['UPLOAD_FOLDER'],'download.jpg'))

            if request.form['go']=='encrypt':
```

```

        return redirect(url_for('image'))

    return redirect(url_for('decode1'))

else:
    return render_template('index.html', error='Please upload an image file')

return render_template('index.html')

@app.route('/image', methods=['GET', 'POST'])
def image():
    if request.method == 'POST':
        image1 = Image.open(UPLOAD_FOLDER+'download.jpg')
        msg=request.form['msg']
        x=encode(image1, msg)
        x.convert('RGB').save(UPLOAD_FOLDER+'new1.png')
        return send_file(UPLOAD_FOLDER+'new1.png', as_attachment=True)

    return render_template('encode.html')

@app.route('/decode')
def decode1():
    image1 = Image.open(UPLOAD_FOLDER+'download.jpg')

    msg1= decrypt(image1)

    return render_template('decode.html',msg=msg1)

if __name__ == '__main__':
    app.run(debug = True)

from model import encode,decrypt

import numpy

```

```

from numpy import as array

from PIL import Image,ImageOps

import os

from flask import Flask, flash, request, redirect, url_for, send_from_directory,
render_template,send_file

from werkzeug.utils import secure_filename

import sqlite3

UPLOAD_FOLDER = os.path.dirname(os.path.abspath(__file__)) + '/uploads/'

ALLOWED_EXTENSIONS = {'png', 'jpg', 'jpeg', 'gif'}

app = Flask(__name__)

app.config['UPLOAD_FOLDER'] = UPLOAD_FOLDER

def allowed_file(filename):

    return '.' in filename and \

        filename.rsplit('.', 1)[1].lower() in ALLOWED_EXTENSIONS

@app.route('/')

def home():

    return render_template('home.html')

@app.route('/logon')

def logon():

    return render_template('signup.html')

```

```

@app.route('/login')

def login():

    return render_template('signin.html')


@app.route("/signup")

def signup():

    username = request.args.get('user',"")

    name = request.args.get('name',"")

    email = request.args.get('email',"")

    number = request.args.get('mobile',"")

    password = request.args.get('password',"")

    con = sqlite3.connect('signup.db')

    cur = con.cursor()

    cur.execute("insert into `info` (`user`,`email`,`password`,`mobile`,`name`)
VALUES (?,
    ?, ?, ?, ?)",(username,email,password,number,name))

    con.commit()

    con.close()

    return render_template("signin.html")

@app.route("/signin")

def signin():

    mail1 = request.args.get('user',"")

    password1 = request.args.get('password',"")

```

```

con = sqlite3.connect('signup.db')

cur = con.cursor()

cur.execute("select `user`, `password` from info where `user` = ? AND
`password` =
?",(mail1,password1,))

data = cur.fetchone()

if data == None:

    return render_template("signin.html")

elif mail1 == 'admin' and password1 == 'admin':

    return render_template("intro.html")

elif mail1 == str(data[0]) and password1 == str(data[1]):

    return render_template("intro.html")

else:

    return render_template("signup.html")

@app.route('/index', methods=['GET', 'POST'])

def index():

    if request.method == 'POST':

        # check if the post request has the file part

        if 'file' not in request.files:

            flash('No file part')

            return 'No file part'

        file = request.files['file']

        if file.filename == "":

            return render_template('index.html', error='No image uploaded!')

```



```

if file and allowed_file(file.filename):

    file.save(os.path.join(app.config['UPLOAD_FOLDER'], 'download.jpg'))

    if request.form['go']=='encrypt':
return redirect(url_for('image'))

    return redirect(url_for('decode1'))

    else:

        return render_template('index.html', error='Please upload an image file')

return render_template('index.html')

@app.route('/image', methods=['GET', 'POST'])
def image():

    if request.method == 'POST':

        image1 = Image.open(UPLOAD_FOLDER+'download.jpg')

        msg=request.form['msg']

        x=encode(image1, msg)

        x.convert('RGB').save(UPLOAD_FOLDER+'new1.png')

        return send_file(UPLOAD_FOLDER+'new1.png', as_attachment=True)

return render_template('encode.html')

@app.route('/decode')
def decode1():

    image1 = Image.open(UPLOAD_FOLDER+'download.jpg')

    msg1= decrypt(image1)

```

```
        return render_template('decode.html',msg=msg1)

if __name__ == '__main__':

    app.run(debug = True)
```

6. RESULTS

Install Python Step-by-Step in Windows and Mac:

Python a versatile programming language doesn't come pre-installed on your computer devices. Python was first released in the year 1991 and until today it is a very popular high programming language. Its style philosophy emphasizes code readability with its use of great whitespace.

The object-oriented approach and language construct provided by Python enables programmers to write both clear and logical code for projects. This software does not come pre-packaged with Windows.

How to Install Python on Windows and Mac:

There have been several updates in the Python version over the years. The question is how to install Python? It might be confusing for the beginner who is willing to start learning Python but this tutorial will solve your query. The latest or the newest version of Python is version 3.7.4 or in other words, it is Python 3.

Note: The python version 3.7.4 cannot be used on Windows XP or earlier devices.

Before you start with the installation process of Python. First, you need to know about your System Requirements. Based on your system type i.e. operating system and based processor, you must download the python version. My system type is a Windows 64-bit operating system. So the steps below are to install python version 3.7.4 on Windows 7 device or to install Python 3. Download the Python Cheat sheet [here](#). The steps on how to install Python on Windows 10, 8 and 7 are divided into 4 parts to help understand better.

Download the Correct version into the system

Step 1: Go to the official site to download and install python using Google Chrome or any other web browser. OR Click on the following link: <https://www.python.org>



Now, check for the latest and the correct version for your operating system.

Step 2: Click on the Download Tab.



Step 3: You can either select the Download Python for windows 3.7.4 button in Yellow Color or you can scroll further down and click on download with respective to their version. Here, we are downloading the most recent python version for windows 3.7.4

Looking for a specific release?

Python releases by version number:

Release version	Release date		Click for more
Python 3.7.4	July 8, 2019	Download	Release Notes
Python 3.6.9	July 2, 2019	Download	Release Notes
Python 3.7.3	March 25, 2019	Download	Release Notes
Python 3.4.10	March 18, 2019	Download	Release Notes
Python 3.5.7	March 18, 2019	Download	Release Notes
Python 2.7.16	March 4, 2019	Download	Release Notes
Python 3.7.2	Dec. 24, 2018	Download	Release Notes

Step 4: Scroll down the page until you find the Files option.

Step 5: Here you see a different version of python along with the operating system.

Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		6811671e5b2db4ae77b9ab01b0f9be	23017663	SIG
XZ compressed source tarball	Source release		d33e4aa66097051c2eca45ee3604803	17131432	SIG
macOS 64-bit/32-bit installer	Mac OS X	for Mac OS X 10.6 and later	6428b4fa75d3daf1a442c8a1cee08e6	34898416	SIG
macOS 64-bit installer	Mac OS X	for OS X 10.9 and later	5db805c38217a45773bffe4e936b243f	28082845	SIG
Windows help file	Windows		063099573a2c96b2ac56cade6b47cd2	8131761	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	98003c3ef85e18dab6c2184a0720a2	7504391	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	a702b4b0ad76db6b3543a383e563400	26480368	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	28b31c6088bd72a8b653a3bd351b4bd2	1362904	SIG
Windows x86 embeddable zip file	Windows		99ab3b818841879da94133574139d8	6741626	SIG
Windows x86 executable installer	Windows		33c802942a54446a38b451476394789	25663848	SIG
Windows x86 web-based installer	Windows		2a670cfa5d117df82c30983ea371d87c	1324608	SIG

- To download Windows 32-bit python, you can select any one from the three options:

Windows x86 embeddable zip file, Windows x86 executable installer or Windows x86 web- based installer.

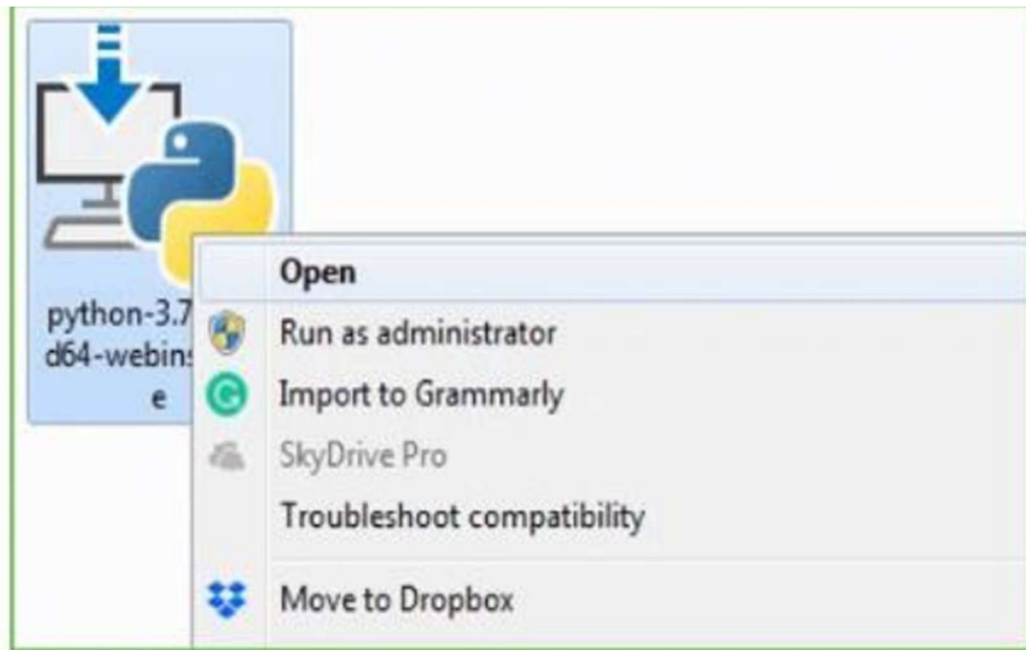
- To download Windows 64-bit python, you can select any one from the three options: Windows x86-64 embeddable zip file, Windows x86-64 executable installer or Windows x86-64 web-based installer.

Here we will install Windows x86-64 web-based installer. Here your first part regarding which version of python is to be downloaded is completed. Now we move ahead with the second part in installing python i.e. Installation.

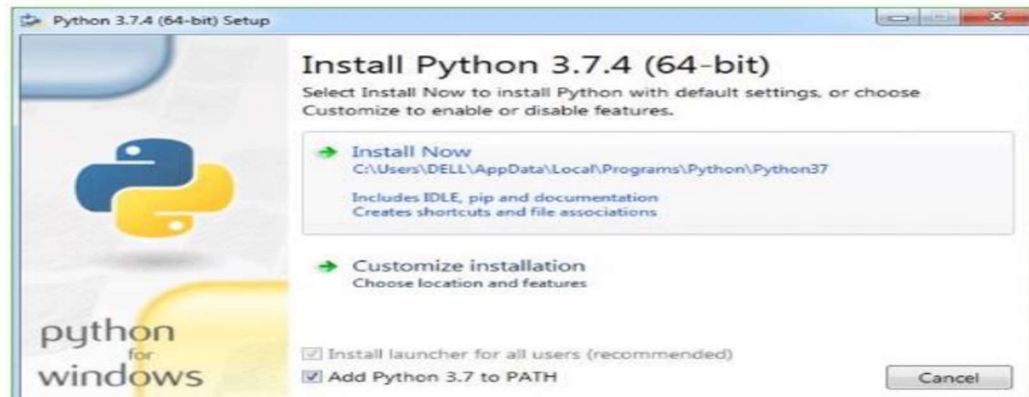
Note: To know the changes or updates that are made in the version you can click on the Release Note Option.

Installation of Python

Step 1: Go to Download and Open the downloaded python version to carry out the Installation process.



Step 2: Before you click on Install Now, Make sure to put a tick on Add Python 3.7 to path.



Step 3: Click on Install NOW After the installation is successful. Click on Close.



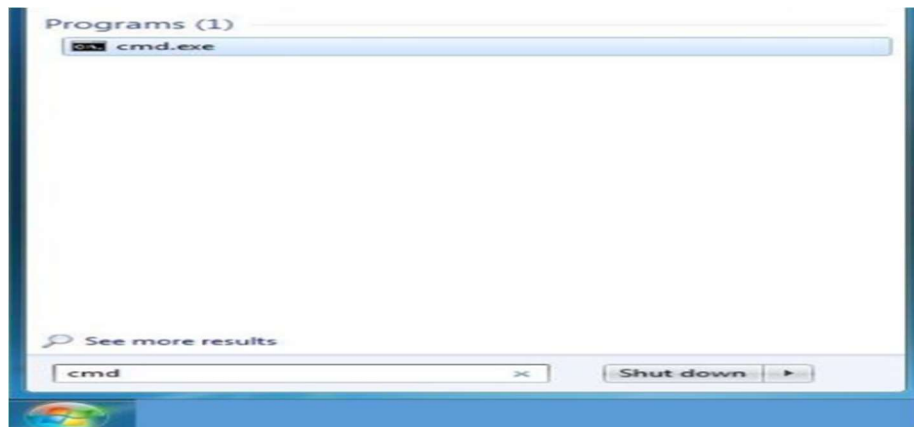
With these above three steps on python installation, you have successfully and correctly installed Python. Now is the time to verify the installation.

Note: The installation process might take a couple of minutes.

Verify the Python Installation

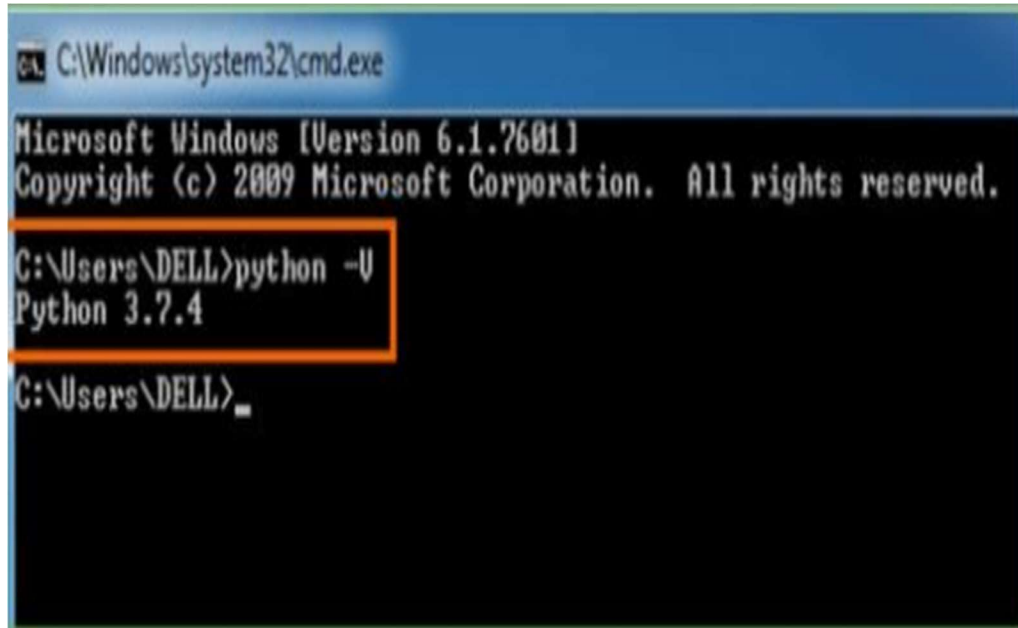
Step 1: Click on Start

Step 2: In the Windows Run Command, type “cmd”.



Step 3: Open the Command prompt option.

Step 4: Let us test whether the python is correctly installed. Type python -V and press Enter.



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\DELL>python -V
Python 3.7.4

C:\Users\DELL>_
```

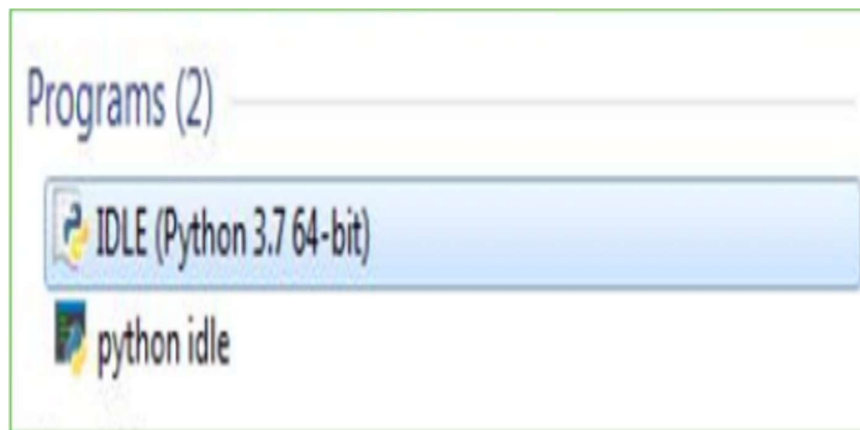
Step 5: You will get the answer as 3.7.4

Note: If you have any of the earlier versions of Python already installed. You must first uninstall the earlier version and then install the new one.

Check how the Python IDLE works

Step 1: Click on Start

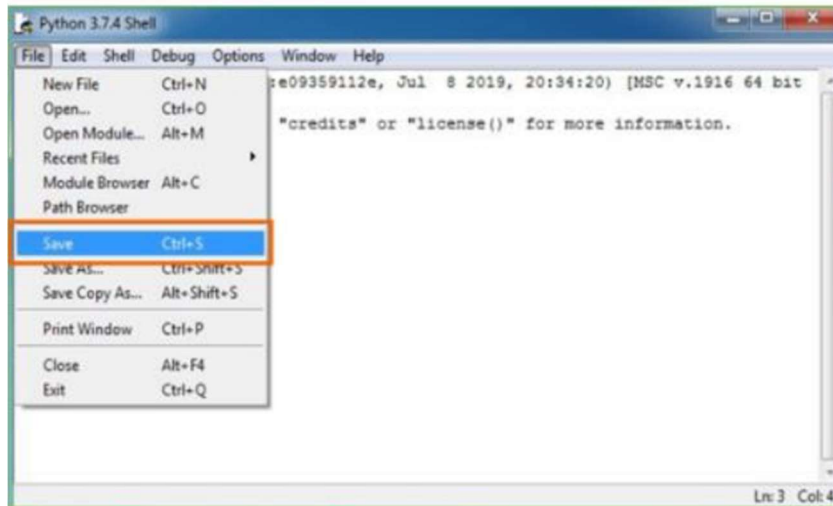
Step 2: In the Windows Run command, type “python idle”.



Step 3: Click on IDLE (Python 3.7 64-bit) and launch the program

Step 4: To go ahead with working in IDLE you must first save the file.

Click on File > Click on Save

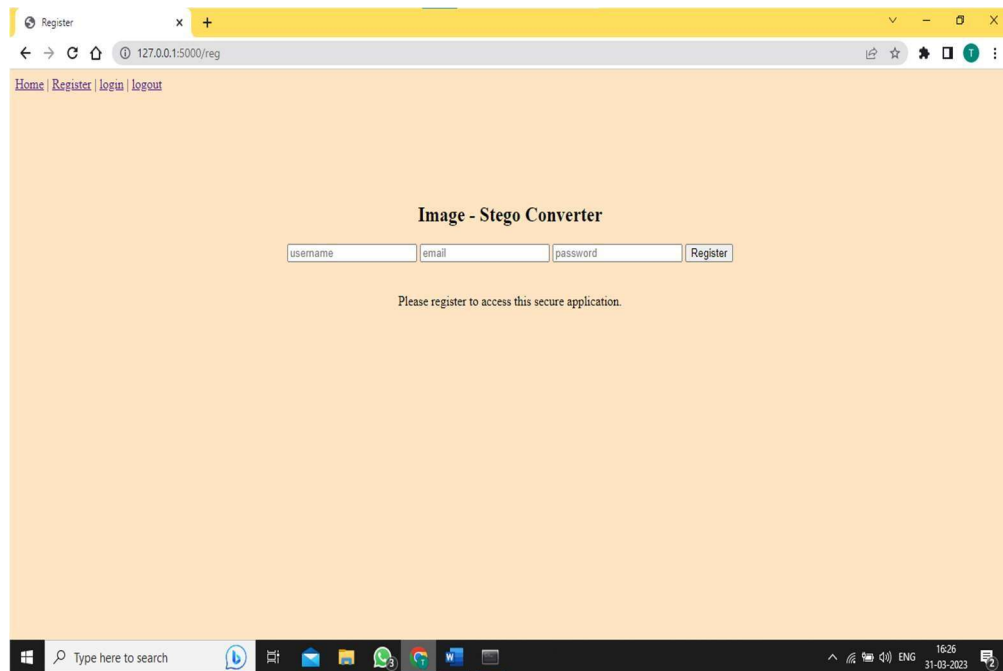


Step 5: Name the file and save as type should be Python files. Click on SAVE.

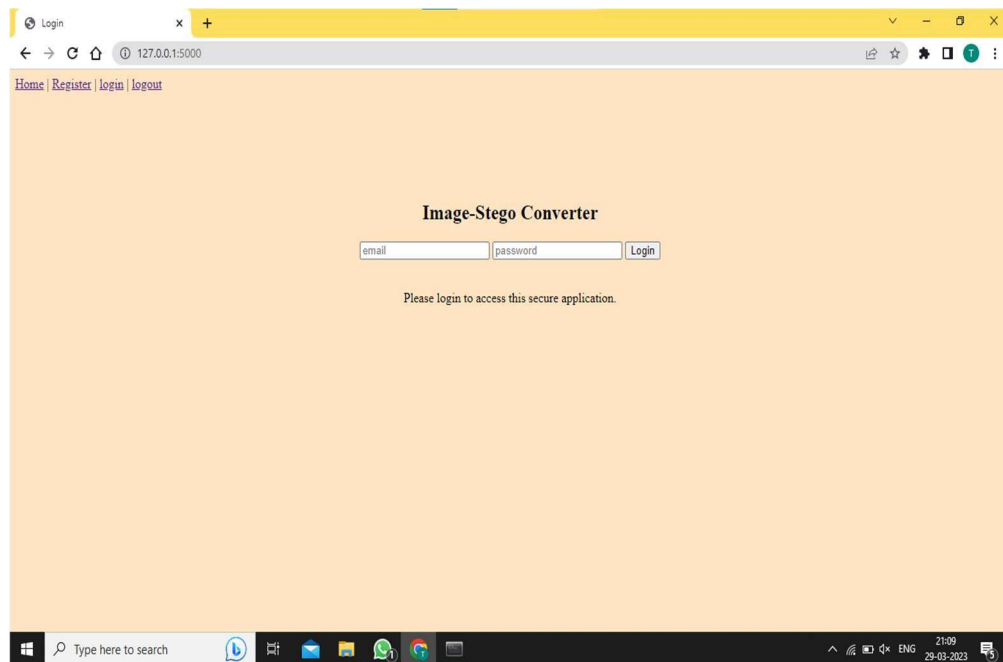
Here I have named the files as Hey World.

Step 6: Now for e.g. enter print.

7.EXECUTION SCREENSHOTS :

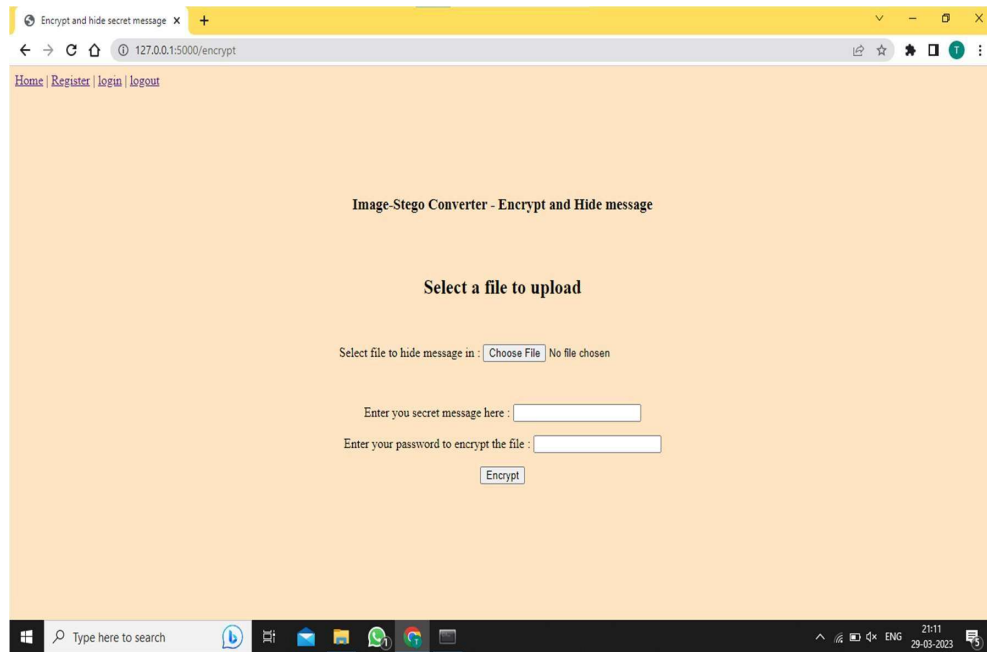


Screenshot 7.1 Registration Page

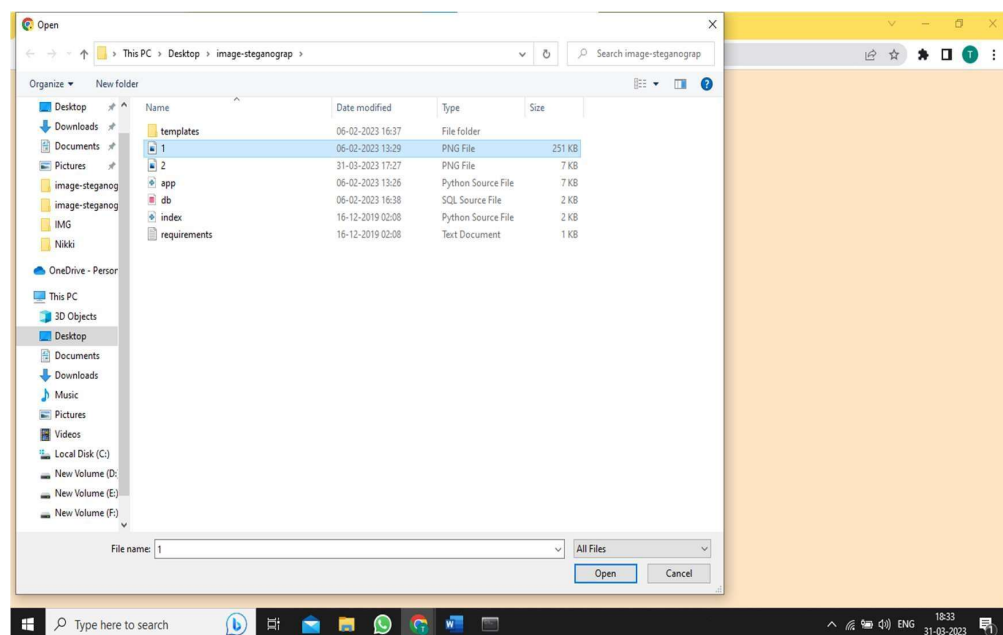


Screenshot 7.2 Login Page

SECURE DATA TRANSFER THROUGH INTERNET USING CRYPTOGRAPHY & IMAGE STEGANOGRAPHY

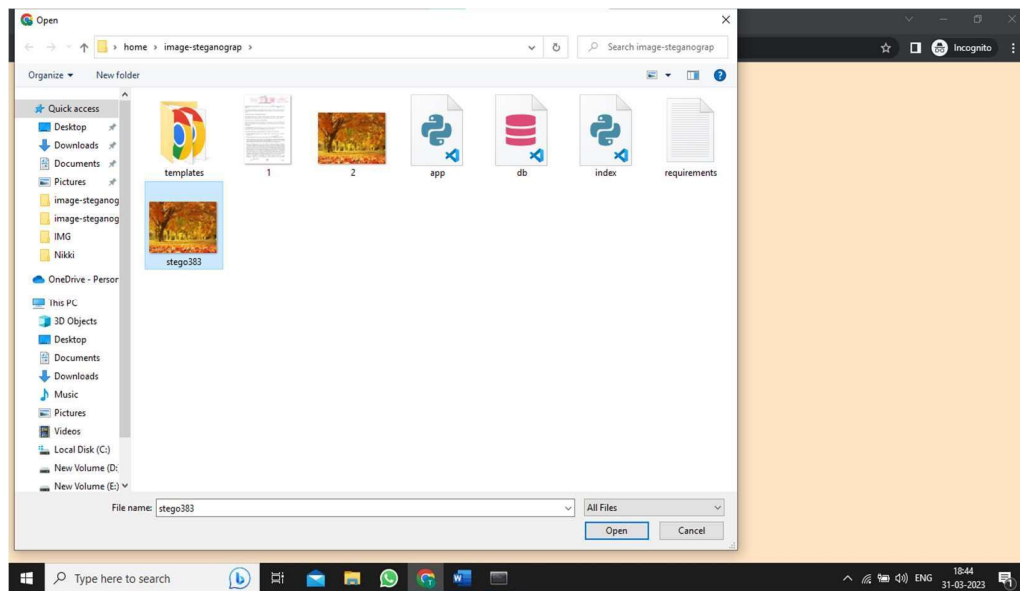


Screenshot 7.3 Homepage

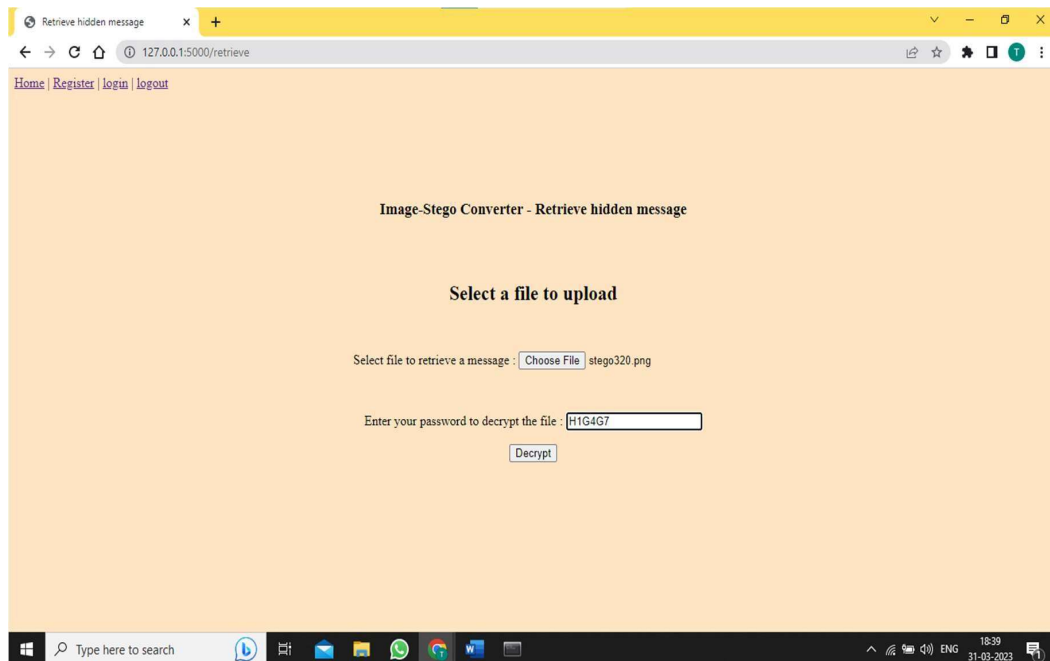


Screenshot 7.4 Uploading Image File

SECURE DATA TRANSFER THROUGH INTERNET USING CRYPTOGRAPHY & IMAGE STEGANOGRAPHY

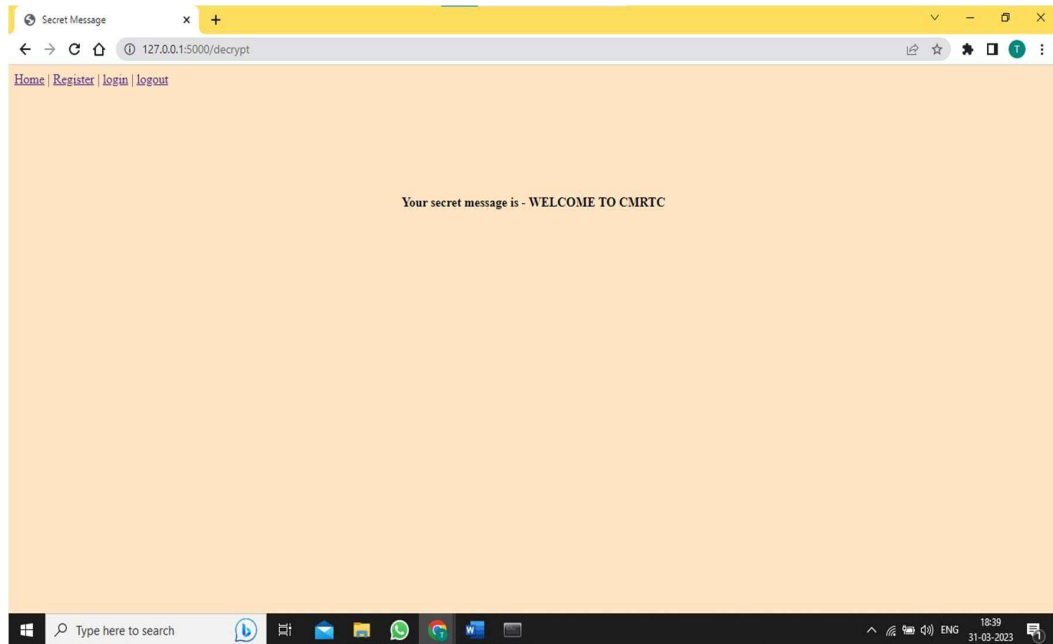


Screenshot 7.5 Encrypted File location



Screenshot 7.6 Decrypting image with Key

SECURE DATA TRANSFER THROUGH INTERNET USING CRYPTOGRAPHY & IMAGE STEGANOGRAPHY



Screenshot 7.7 Decrypted Text

8.TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product .

It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

Testing involves operation of a system or application under controlled conditions and evaluating the results. The controlled conditions should include both normal and abnormal conditions. Testing should intentionally attempt to make things go wrong to determine if things happen when they shouldn't or things don't happen when they should. It is oriented to 'detection'.

8.1 TYPES OF TESTS:

8.1.1. UNIT TESTING:

Unit testing is a software development process in which the smallest testable parts of an application, called units, are individually and independently scrutinized for proper operation. Unit testing is often automated but it can also be done manually. This testing mode is a component of Extreme Programming (XP), a pragmatic method of software development that takes a meticulous approach to building a product by means of continual testing and revision.

Unit tests are written from a programmer's perspective. They ensure that a particular method of a class successfully performs a set of specific tasks. Each test confirms that a method produces the expected output when given a known input.

8.1.2. PERFORMANCE TESTING:

Performance testing is the process of determining the speed or effectiveness of a computer, network, software program or device. This process can involve quantitative tests done in a lab, such as measuring the response time or the number of MIPS (millions of instructions per second) at which a system functions. Qualitative attributes such as Reliability, scalability and interoperability may also be evaluated. Performance testing is often done in conjunction with stress testing.

Performance testing can verify that a system meets the specifications claimed by its manufacturer or vendor. The process can compare two or more devices or programs in terms of parameters such as speed, data transfer rate, bandwidth, throughput, efficiency or reliability.

Performance testing can also be used as a diagnostic aid in locating communications bottlenecks. Often a system will work much better if a problem is resolved at a single point or in a single component. For example, even the fastest computer will function poorly on today's Web if the connection occurs at only 40 to 50 Kbps (kilobits per second).

8.1.3. INTEGRATION TESTING:

Integration testing, also known as integration and testing (I&T), is a software development process which program units are combined and tested as groups in multiple ways. In this context, a unit is defined as the smallest testable part of an application. Integration testing can expose problems with the interfaces among program components before trouble occurs in real-world program execution. Integration testing is a component of Extreme Programming (XP), a pragmatic method of software development that takes a meticulous approach to building a product by means of continual testing and revision.

8.2 TEST CASES :

Test Case1:

Test case for Login form:

FUNCTION:	LOGIN
EXPECTED RESULTS:	Should Validate the user and check his existence in database
ACTUAL RESULTS:	Validate the user and checking the user against the database
LOW PRIORITY	No
HIGH PRIORITY	Yes

Test case2:

Test case for User Registration form:

FUNCTION:	USER REGISTRATION
EXPECTED RESULTS:	Should check if all the fields are filled by the user and saving the user to database.
ACTUAL RESULTS:	Checking whether all the fields are field by user or not through validations and saving user.
LOW PRIORITY	No
HIGH PRIORITY	Yes

Test case3:

Test case for Change Password:

When the old password does not match with the new password, then this results in displaying an error message as “OLD PASSWORD DOES NOT MATCH WITH THE NEW PASSWORD”.

FUNCTION:	Change Password
EXPECTED RESULTS:	Should check if old password and new password fields are filled by the user and saving the user to database.
ACTUAL RESULTS:	Checking whether all the fields are field by user or not through validations and saving user.
LOW PRIORITY	No
HIGH PRIORITY	Yes

8. CONCLUSION

The EGC protocol generated high levels of data security to serve the purpose of protecting data during transmission in the IoT. With the novel ECC over Galois field, the proposed EGC protocol provided better security. Due to the enhanced embedding efficiency, advanced data hiding capacity can be achieved. With the help of the proposed protocol and Adaptive Firefly optimization, any amount of data can be easily transmitted over the IoT network securely hidden within the profound layers of images. Performance is evaluated with parameters, such as embedding efficiency, PSNR, carrier capacity, time complexity, and MSE. Finally, the proposed work is implemented in a MATLAB simulator, and approximately 86% steganography embedding efficiency was achieved. where a secret key points to parts of a cover image forming the message, can remain undetected since the cover image provides no information about the message. The paper studied different categories of crypto-steganographic articles, providing insights into its principles that can guide the identification of new application areas and improve existing ones, such as mobile communication security, cloud security, and internet banking. The suggested algorithm found no detectable distortion in the stego image, as seen by the naked eye.

9.

BIBLIOGRAPHY

10.1 REFERENCES

PYTHON REFERENCES:

1. Python Crash Course: A Hands-On, Project-Based Introduction to Programming
(2nd Edition)
Author: Eric Matthes
2. Head-First Python: A Brain-Friendly Guide (2nd Edition)
Author: Paul Barry
3. Learn Python the Hard Way: 3rd Edition
Author: Zed A. Shaw
4. Python Programming: An Introduction to Computer Science (3rd Edition)
Author: John M. Zelle
5. Python Cookbook: Recipes for Mastering Python 3 (3rd Edition)
Authors: Brian Jones, David Beazley
6. Python Crash Course
Author: Eric Matthews
7. Head-First Python, 2nd Edition
Author: Paul Barry.
8. Python Programming : An Introduction to Computer Science (3rd Edition)
Author: John Zelle
9. A Byte of Python
Author: C.H. Swaroop
10. Learning with Python: How to Think Like a Computer Scientist
Allen Downey, Jeff Elkner, and Chris Meyers.

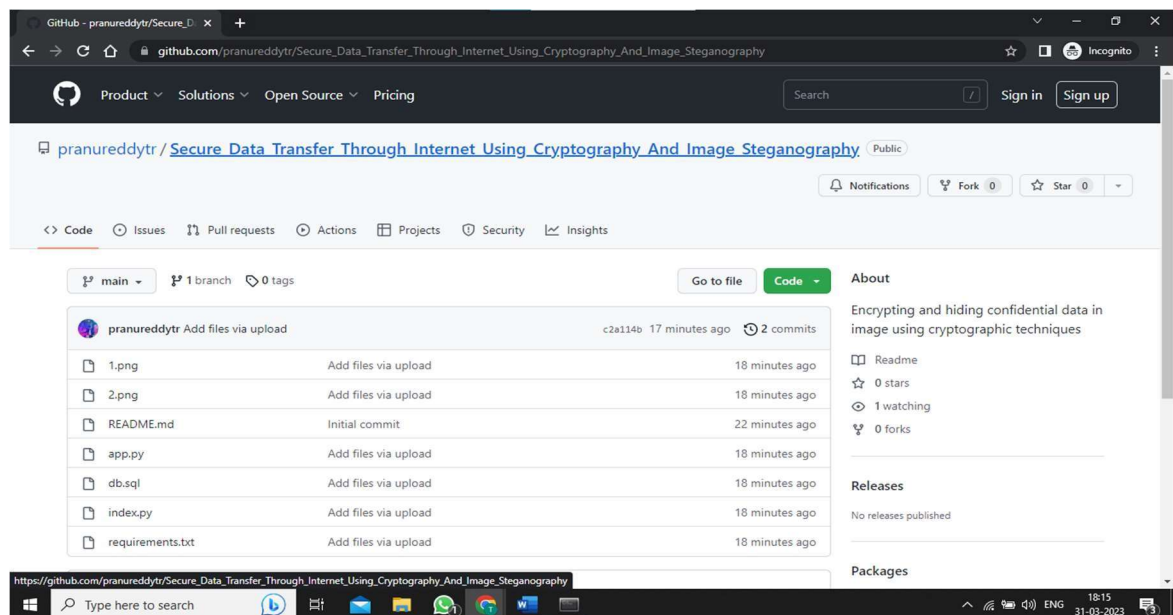
HTML REFERENCES:

1. HTML & CSS: The Complete Reference
5th Edition
Author Thomas A. Powell

2. Learn HTML in Easy Way
Author Ritesh Kumar
3. HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)
DT Editorial Services
4. HTML: The Complete Reference
Thomas A. Powell
5. HTML & CSS Coding Practice
EBISUCOM
6. HTML 5 for Beginners
Firuza Aibara

10.2 GITHUB LINK:

https://github.com/pranureddytr/Secure_Data_Transfer_Through_Internet_Using_Cryptography_And_Image_Steganography



Secure Data Transfer Through Internet Using Cryptography And Image Steganography

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Abstract- It is important to note that while cryptography and steganography can be effective in mitigating security challenges in the transfer of IoT data, they are not foolproof and can still be vulnerable to attacks. Implementing multiple layers of security is imperative regularly update and improve security measures to stay ahead of potential threats. Additionally, it is important to consider the ethical implications of using such techniques. While encryption and data hiding may be necessary to protect sensitive information. It is important to balance security measures with transparency and accountability. Overall, the use of cryptography and steganography can be a valuable tool in securing IoT data transfer, but it should be implemented with caution and in combination with other security measures.

1. INTRODUCTION

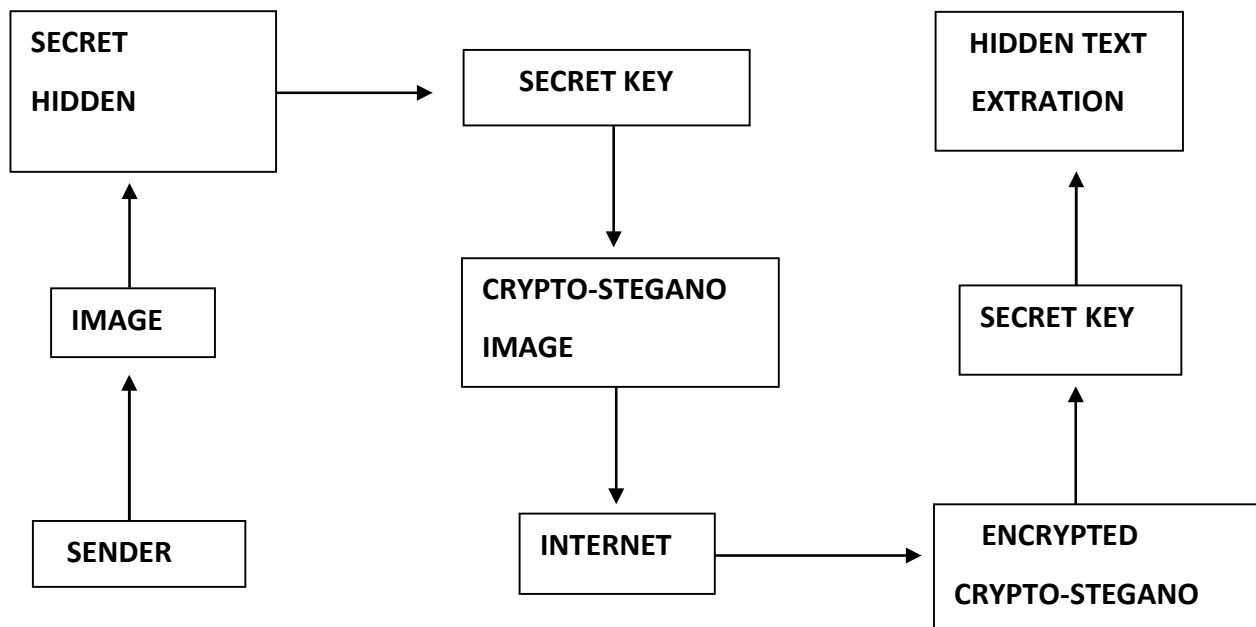
It seems like you have provided a brief introduction to the concept of steganography and its use as a security measure. Steganography involves hiding secret data within a cover file such as an image, audio, video, or text file. The purpose of steganography is to protect sensitive data from malicious attacks by making it difficult for attackers to detect the existence of the data. Unlike cryptography, which makes data unreadable or hides its meaning, steganography hides the very existence of the data. In your application, you have mentioned that only texts can be hidden using the steganography method and that a password needs to be shared, which can be hacked and used. Additionally, you have mentioned that the image needs to be manually sent to the receiver. These limitations may impact the overall effectiveness of the

system. To improve the effectiveness of the system, it is important to consider other types of steganography methods that can hide different types of data, such as audio or video files. Additionally, the use of strong encryption algorithms can improve the security of the system by ensuring that the hidden data remains secure even if the password is compromised. Overall, the concept of steganography has great potential as a security measure, but it is important to consider the limitations and to implement appropriate measures to address them. Interconnected computers, has become an integral part of people's lives and daily routines. Unfortunately, terrorists have recognized the internet's vulnerability and have taken advantage of it as a potential platform for attacks. To safeguard information and computer systems, security measures have been developed to prevent unauthorized access, theft, destruction, or disclosure of data. Confidentiality is crucial since computer usage is typically restricted to a limited number of users, and information can be exposed by hackers, viruses, and worms. Thus, security can be defined as the degree of resistance to, or protection from, harm, which has evolved over time. Steganography, an ancient art and modern science of hidden communication, involves concealing the existence of a message, while cryptography, the art and science of secret communication, introduces secrecy into data and information security by hiding messages using techniques such as encryption. Both cryptography and steganography can be used to provide security to data, but each has its limitations. The issue with cryptography is that the encrypted text may appear meaningless, causing the attacker to become suspicious and scrutinize the information more carefully. On the other hand, steganography's problem is that once the presence of hidden information is suspected, the message may be revealed. In this study, a hybrid technique using both cryptography and steganography is proposed to improve information security. The private message would first be encrypted using the remodified Advanced Encryption Standard (AES) algorithm, and then hidden using a steganographic method. This approach provides two levels of security, along with high embedding capacity and high-quality stego images. By combining these two methods, the data encryption can be performed by a system and then embedded in an image or other media with the help of a stego key, enhancing the security of the embedded data. As data techniques continue to develop, the issue of data security has become increasingly important, particularly with the widespread use of multimedia editing tools. Ensuring security when sharing information technology over insecure channels has become essential. To address this

problem, a model that utilizes neural networks and visual cryptography in image steganography has been proposed to enhance security. To negate the effects of IWT, inverse IWT is applied to the stego image, which is later brought back to its original shape using a data rearrangement process. During decryption, the two shares of the image are retrieved, and inverse visual cryptography is applied to extract and decrypt the message.

2.PROPOSED SYSTEM

This technique to hide the data inside an image is called image steganography. Humans cannot make a difference in the image when the data is embedded in it. It takes quit knowledge and tool practice to identify the image. We are using cryptography and steganography to provide high security to the data over the internet. The encoded secret message is inserted with in the image by the XOR steganography technique.



Description

The web programming languages HTML, CSS, and JavaScript were utilized to develop the interface shown in Figure 7, and Visual Studio Code can be used to implement them. To use this interface, the user must upload an image file and choose the desired level of secrecy. They can then enter the message they wish to transmit in the message box and provide a password

for encryption and embedding the secret message into the image. Once all necessary steps have been taken, the user can click the "Write Message to Image" button. The result is a new image containing the secret message, known as the "Crypto-Stego image." The algorithm utilized for the Least Significant Bit (LSB) technique makes it extremely challenging for the naked eye to detect changes in images sent and received via the internet.

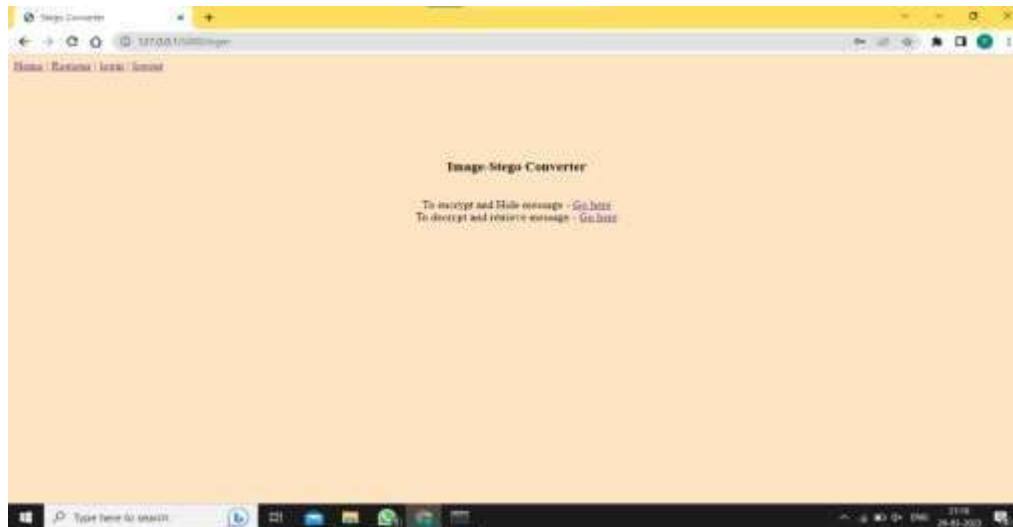


Figure 1. Home Page

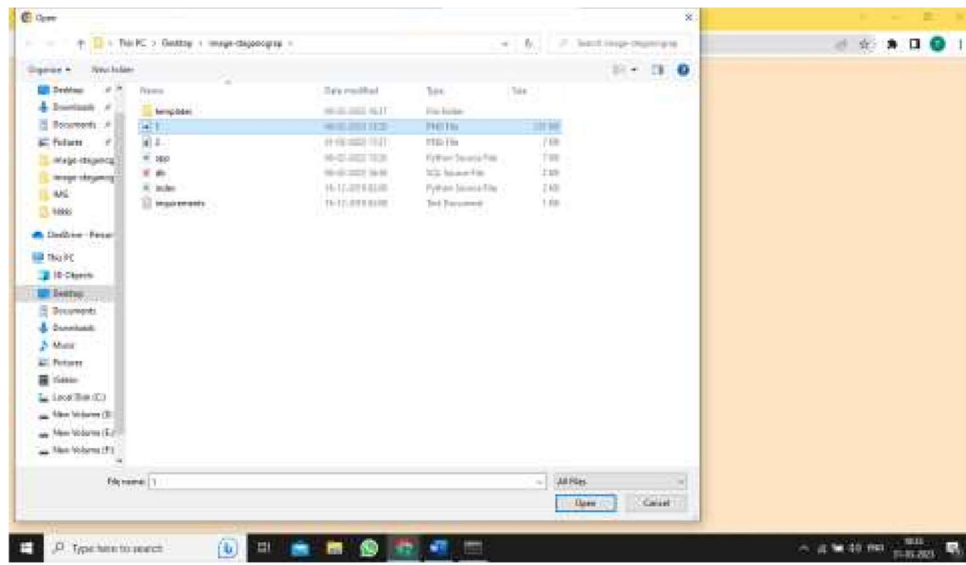


Figure 2. Upload the File

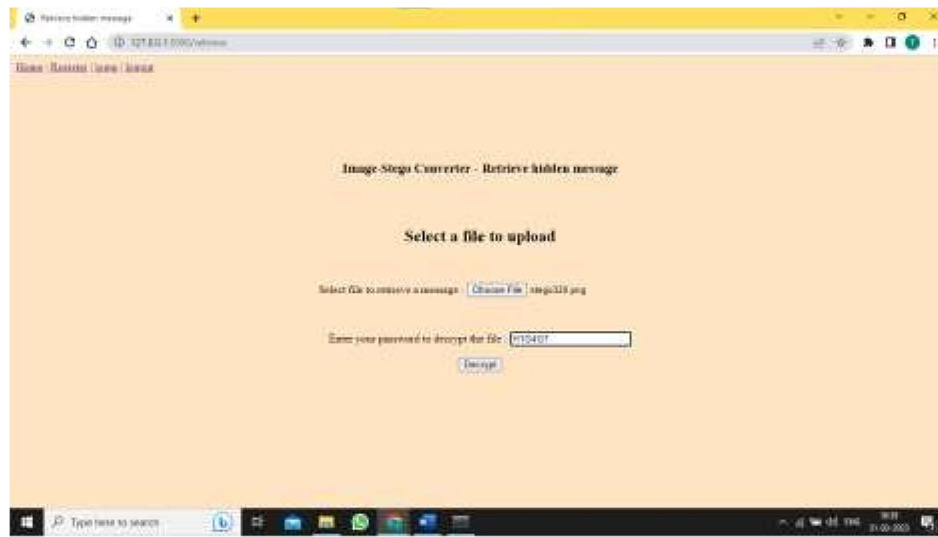


Figure 3. Encryption Stage

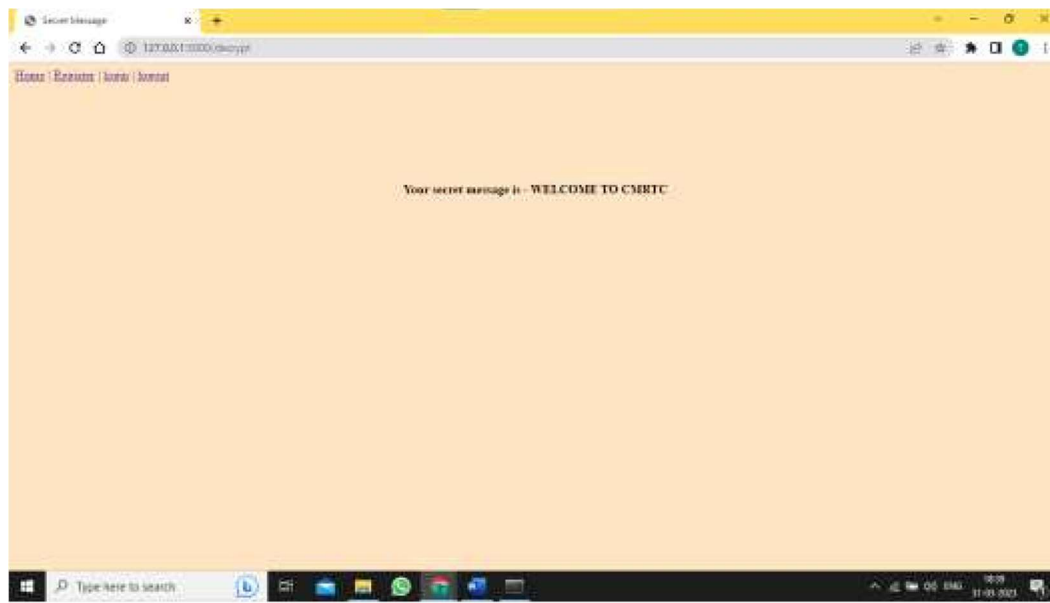


Figure 4. Final result

3. TESTING

S.NO	Test cases	I/O	Expected O/T	Actual O/T	P/F
1	Login	Enter User name, password	Should Validate the user and check his existence in the database	Validating the user and checking the user against the database	P
2	Login	Enter User name, password	Login failed	Incorrect User name	F
3	Login	Enter User name, password	Login failed	Incorrect User password	F
4	Data Adding Encryption	Import Image File and Enter message with key	File Encrypted successfully	File Encrypted successfully	P
5	Data Retrieving Decryption	Import Stegano-File and Enter the Key	File Decrypted successfully	File decrypted successfully	P
6	Data Retrieving Decryption	Import Stegano-file and enter key	File Decrypted successfully	Incorrect Key	F

4. CONCLUSION

To provide a more precise response, could you please clarify which specific EGC protocol you are referring to and how it relates to data security? There are several protocols and systems with this acronym, and more information about the specific one being discussed would be helpful. However, based on the information provided, it seems that the proposed EGC protocol, which uses the novel ECC over Galois field, aims to enhance data security by providing advanced data hiding capacity through steganography. The protocol, when used in conjunction with Adaptive Firefly optimization, enables the embedding of any amount of secret data within cover media such as images or audio files. The protocol's performance is evaluated using several metrics, including embedding efficiency, carrier capacity, time

complexity, and mean square error (MSE), which all aim to assess the quality of the cover media after the secret data has been embedded. The proposed work is implemented in a MATLAB simulator and achieved an embedding efficiency of approximately 86%. The paper suggests that cryptosteganography can provide a high level of security to protect data from unauthorized access, thus enhancing the confidentiality and integrity of messages. Various algorithms were used to address security concerns in cryptography and steganography, and these algorithms can be useful for future research and projects. While techniques for detecting hidden messages are advancing, they cannot guarantee the discovery of all concealed information. Nonetheless, combining detection methods with measures to defeat cryptography and steganography can minimize the chances of hidden communication. Cryptosteganography, where a secret key points to parts of a cover image forming the message, can remain undetected since the cover image provides no information about the message. The paper studied different categories of crypto-steganographic articles, providing insights into its principles that can guide the identification of new application areas and improve existing ones, such as mobile communication security, cloud security, and internet banking. The suggested algorithm found no detectable distortion in the stego image, as seen by the naked eye.

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6. *REFERENCES*

- [1] Python Crash Course: A Hands-On, Project-Based Introduction to Programming (2nd Edition) a. Author: Eric Matthes.
- [2] Head-First Python: A Brain-Friendly Guide (2nd Edition) a. Author: Paul Barry
- [3] Learn Python the Hard Way: 3rd Edition a. Author: Zed A. Shaw

- [4] Python Programming: An Introduction to Computer Science (3rd Edition) a. Author: John M. Zelle
- [5] Python Cookbook: Recipes for Mastering Python 3 (3rd Edition) a. Authors: Brian Jones, David Beazley
- [6] Python Crash Course a. Author: Eric Matthews
- [7] Head-First Python, 2nd Edition a. Author: Paul Barry.
- [8] Python Programming : An Introduction to Computer Science (3rd Edition) a. Author: John Zelle
- [9] A Byte of Python a. Author: C.H. Swaroop
- [10] Learning with Python: How to Think Like a Computer Scientist a. Allen Downey, Jeff Elkner, and Chris Meyers.
- [11] The Complete Reference 5th Edition Author Thomas A. Powell
- [12] Learn HTML in Easy Way Author Ritesh Kumar
- [13] HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) DT Editorial Services
- [14] HTML: The Complete Reference Thomas A. Powell
- [15] HTML & CSS Coding Practice EBISUCOM
- [16] HTML 5 for Beginners Firuza Aibara

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