DATA HIDING FOR VIDEO IN VIDEO

Project report submitted in fulfillment of the requirement for the degree of Bachelor of Technology

In

Computer Science and Engineering

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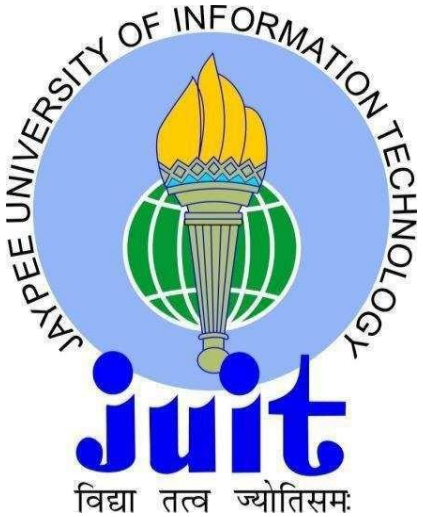
To



Department of Computer Science & Engineering and Information Technology

Jaypee University of Information Technology Waknaghat, Solan-173234, Himachal Pradesh

CERTIFICATE

Candidate's Declaration

This is to certify that the work which is being presented in the report entitled **"Data hiding for video in video"** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology**,** Jaypee University of Information Technology Waknaghat is an authentic record of our own work carried out over a period from April 19, 2017 to May 26, 2017 under the supervision of **Ms. Rekha M. Gokhale** Member in the department of Education, Training and Assessment at Mysuru Development Centre, Infosys Technologies Ltd, Karnataka).

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

Sameer Garg, 131239

This is to certify that the above statement made by the candidates is true to the best of my knowledge.

Ms. Rekha M. Gokhale
Member,
ETA, Infosys Technologies Ltd.
Dated: 25th May, 2017

ACKNOWLEDGEMENT

We owe our profound gratitude to our project mentor **Ms. Rekha M. Gokhale** who took keen interest and guided us all along in our project work titled **—Data hiding for video in video**, till the completion of our project by providing all the necessary information for developing the project. The project development helped us in enhancing our research in our domain. We are really thankful to her.

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ABSTRACT

A steganography application that will be used to hide one video in another video and that too encrypted with AES. On requirement the hidden video can be obtained from the encrypted video by giving the encryption key.

- Users can hide one video in another video and also give an encryption key.
- Users and admin can login, logout, signup etc.
- Admins can decrypt any video they want.

CHAPTER

INTRODUCTION

Nowadays, information is one of the most valuable possessions of companies, organizations and individuals. From the beginning of time, people try to search information saved on various kinds of storage. It is an online application for hiding a video in another video. It is named video steganography. It mainly lets the users upload the cover and the target videos, and also asks them for an encryption key. Following that the videos are merged using LSB and the end product is visibly similar to the cover video. Later if the user wants he/she can decrypt the same by specifying the encryption key stated before and obtain the target video back.

The application provides the feasibility to the user at a great extent being a user-interactive application .The users can easily signup to use the website. After logging in they can upload the videos from their file directory. The videos uploaded can be played inside the player on the webpage. Then the user then provides the encryption keys and presses the encrypt button. The video then obtained is the merged and encrypted video that visibly plays like the cover video but actually stores the target video beneath it. Then if the user wants to decrypt the video and obtain the target video back, they can use the decryption option in the website. There they just upload the encrypted and merged video and also equip the website with the encryption key for that video. Then after pressing the decryption button the target video can be obtained as original one.

The user has also got some functionality related to forgetting password. To set a new password the user has to authenticate himself by answering the security question submitted by him during the signing up on the website. Then the new password can be set. The user can also have a view of the development team as well as the technology stack deployed in the website.

1.1) PROBLEM STATEMENT

With the increasing corrupt practices of the organizations and governments all around the globe steganography becomes very handy. Steganography can be deployed by hiding any text, image, video in any other media. The aim here is to hide a video in another video. Such that initially it is hided and also encrypted, so that if in any case someone extracts the target video, he/she cannot obtain the content without the encryption key used by the user while encrypting thus a very secure means to hide the video.

On the other hand when the video is hid and sent to the desired place, then according to requirement the video shall be decrypted and target video may be obtained as and when required. The decryption can only be possible if the user decrypting has the decryption keys, thus having a legitimate use of data hiding concept.

The website shall implement the basic functionality of the new user sign up, login, logout, forgot password. It should display the details of the development team as well as technology stack used. It should be a single page application.

1.2) OBJECTIVE

The primary aim is to provide a user-friendly and a fully functional website that can help the users apply steganography online by uploading videos and encrypting them. The users can create there accounts like any other websites and thus exploit the complete functionality of the website from encryption to decryption.

The motive is to become completely aware and familiar with the technology used for the implementation of the project and make the best use of it for our project completion. Thus we aim at drawing out results which could be used in future in real-time projects by means of collective learning, problem solving and collaborative research work through proper coordination and cooperation.

1.3) METHODOLOGY

Data hiding for a video in video is divided into three tiers. Each tier has some functional responsibility which adds to the feature of the project. Also, project division into tiers make our project modularized and easy for maintenance. The different tiers are-

1. Presentation Tier – This tier consist of the view which is shown to user who is using it. The tier is made in such a way that a person who is using it finds it user friendly and easy to use. The technologies used in this tier are different front end languages like Angular.js, HTML5, CSS3 and Bootstrap. Also, some client side validations are done which are coded in JavaScript and use of some controllers in angular-JS which promotes our data to feed to databases through various methods like GET,POST and delete(if required).This tier also includes the JSP for dynamic webpages, where the data is fetched from the business tier at the runtime.

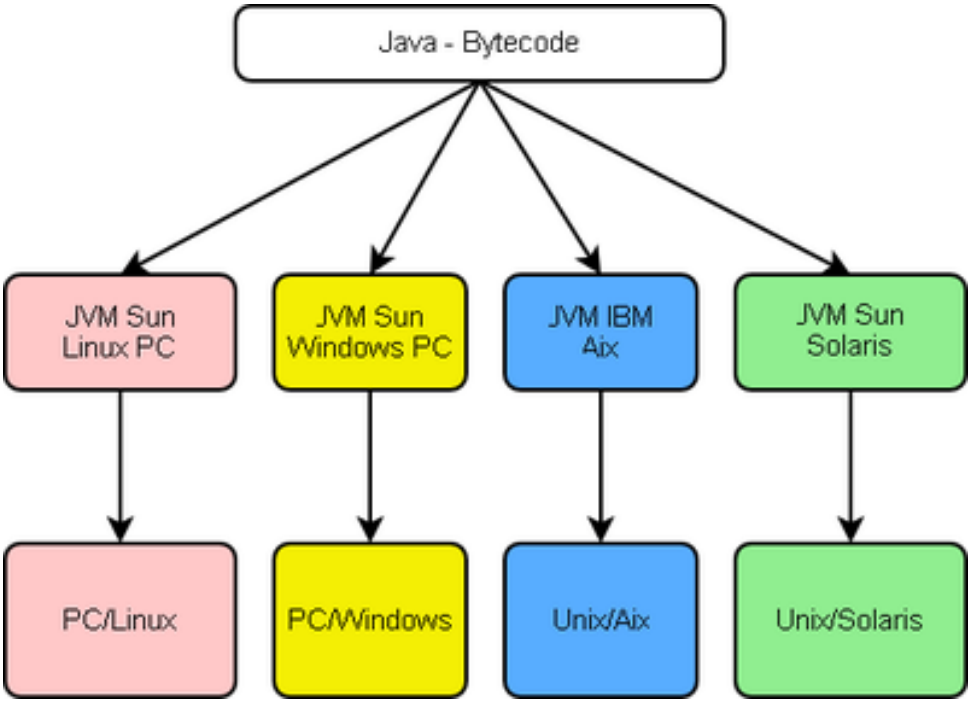
2. Business Tier – This tier deals with different business logics which are required to be done for the fulfillment of project. Also the project includes various service classes to pass the data to the other tier which interacts with the databases. It also include various validation classes and different methods for username verification etc. The servlets are also deployed for the session management in the website.

3. Persistence tier – The main job of this this tier is to interact with databases. The tier is responsible for inserting the data, updating of data, and deletion of data or fetching of data from the databases. It uses entity classes to interact with databases. Here various technologies like Hibernate, HQL and criteria API are used.

1.4) LITERATURE SURVEY

Our project depends on different languages-

1. **Java:** Java is a simple, object-oriented programming language developed to serve various business domains like banking, insurance, education, entertainment etc. Features of Java include-Object Oriented, Robust, simple, Multi-threaded, Secure and platform independent. If a program written on a particular platform can run on other platforms without any recompilation, it is known as **platform independence**. Since Java is **platform independent**, it is not a problem. A program written using Java on Windows will execute **without any recompilation** on any other platform.



Schema of general architecture

2. **Hibernate: With the help of hibernate,** a Java application can store, retrieve or process the data in or from a file system and database. Hibernate is an open source ORM implementation for Java developers which follows JPA standards.

Advantages of Hibernate-

- Hibernate supports Inheritance, Associations, Collections.
- Hibernate supports relationships like One-To-Many, One-To-One, Many-To-Many-to-Many, Many-To-One.
- Hibernate has capability to generate primary keys automatically while we are storing the records into database
- Hibernate has its own query language, i.e. hibernate query language which is database independent
- Hibernate supports annotations, apart from XML
- Hibernate supports caching mechanism by this, the number of round trips between an application and the database will be reduced, by using this caching technique an application performance will be increased automatically.

4. **Bootstrap:** It contains various classes that help in designing responsive webpages. It has many classes required for adding styles to text and UI components. The major advantage of Bootstrap over CSS is that in CSS the degree of compatibility varies with various browsers. Bootstrap is a **complete CSS framework** offering Grid system and configurations, Typography classes and UI components like forms and tables. It is a widely used framework in the development of **responsive** website.

5. **Angular -JS:** commonly referred to as "**Angular.js**" or "**Angular JS 1.X**" is a JavaScript-based open-source front-end web application framework mainly maintained by Google and by a community of individuals and corporations to address many of the challenges encountered in developing single-page applications. The JavaScript components complement Apache Cordova, the framework used for developing cross-platform mobile apps. It aims to simplify both the development and the testing of such applications by providing a framework for client-side model–view–controller (MVC) and model–view–viewmodel (MVVM) architectures, along with components commonly used in rich Internet applications.

   The Angular JS framework works by first reading the HTML page, which has embedded into it additional custom tag attributes. Angular interprets those attributes as directives to bind input or output parts of the page to a model that is represented by standard JavaScript variables. The values of those JavaScript variables can be manually set within the code, or retrieved from static or dynamic JSON resources.

CHAPTER 2

SYSTEM DEVELOPMENT

The primary priorities of this design are, in order of importance:

1) Functionality
2) Reliability
3) Maintainability
4) Security and Privacy
5) Scalability
6) Interfaces

2.1 FUNCTIONAL REQUIREMENTS

1. There shall be a signup page for a new user where he can enter his details mainly his name, gender, username (which will be unique), password, phone number etc.
2. There will be a common login portal for users and admin so that he/she can login to their respective account.
3. There will be a an option to encrypt the videos where the videos can be uploaded
4. There will also be an option to decrypt the videos, where the encrypted video is uploaded and an encryption key has to be provided too.
5. There has to be a functionality of forgot password.
6. There has to be a section showing the about us and the technology stack used
7. The password stored has to be encrypted

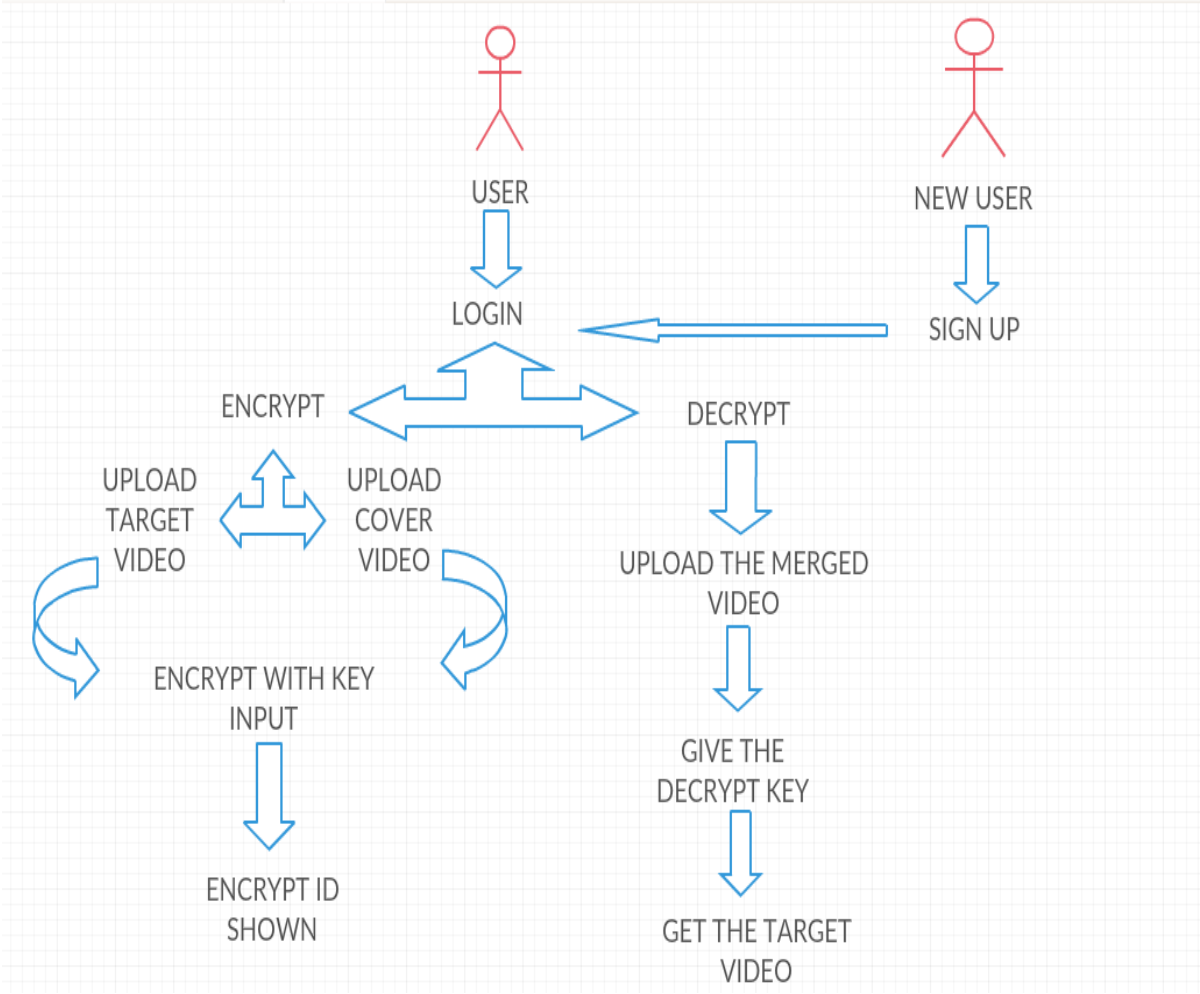
2.2 SOFTWARE REQUIREMENTS

ENVIRONMENT	VS-2015, SQL Server 2012 or above.
Language and Web Technology	**JavaScript**

2.3 HARDWARE REQUIREMENTS

OPERATING SYSTEM	Windows 7 or above
RAM	4GB RAM
HARD DISK	80 GB Hard disk

2.4 SYSTEM DESIGN:

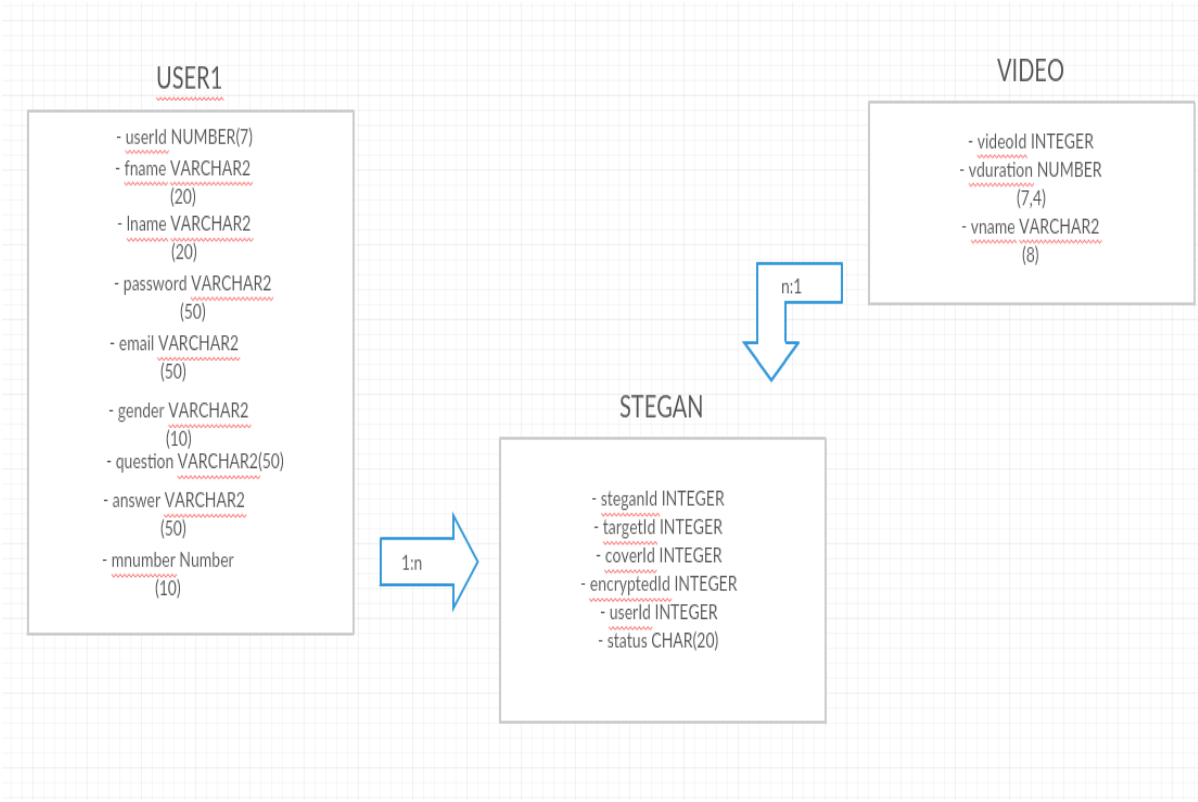


The user has mainly two functionalities that are encryption and decryption.

In encryption the user tends to upload the cover as well as the target videos. This is followed by input of the encryption key by the user for deployment of AES encryption.

The user when has to decrypt the video, he uploads the encrypted cum merged video and also gives the decryption key again. Then the user gets the target video back again for viewing as well as in the file directory.

2.5 DATABASE DESIGN:



Database Schema

User1 stores the details of the user while signup and user credentials that are used by to login in system.

Video table stores the information related to each video uploaded on the website. It contains the details of the target and the cover video as well as the encrypted videos.

Stegan table stores the details about each of the encryption transactions. It references the ID for each of the videos involved from the video table.

USER1 TABLE

No.	Field Name	Description	Size	Type	Optional/ Mandatory?	Occurs (Instances of attribute)	Default values
1	userId	UserId acts as the primary key .	7	Number	mandatory		No
2	fname	It is used to first name	20	VARCH	mandatory		No

		of the user		AR2			
3	lname	It is used to last name of the user	20	VARCHAR2	mandatory		No
4	password	It is used to store the password	50	VARCHAR2	mandatory		No
5	email	It is used to store the email of the correspondi ng user	50	VARCHAR2	mandatory		No
6	gender	It is used to store the gender correspondi ng user	10	VARCHAR2	mandatory		No
7	question	Secret question for forgot password	50	VARCHAR2	mandatory		No
8	Answer	Answer for the secret question	50	VARCHAR2	mandatory		No
9	Mnumber	Mobile no. of the user	10	Number	mandatory		No

VIDEO TABLE:

No.	Field Name	Description	Size	Type	Optional/ Mandatory?	Occurs (Instances of attribute)	Default values
1	videoId	It is a unique generated value that acts as the primary key of this table.	38	Integer	mandatory		No
2	vduration	It is used to	7	NUMBE	mandatory		No

		store duration of the video uploaded		R			
3	vname	It is used to store the name of the video	8	VARCHAR2	mandatory		No

STEGAN TABLE:

No.	Field Name	Description	Size	Type	Optional/ Mandatory?	Occurs (Instances of attribute)	Default values
1	steganId	It is being auto generated .It acts as the primary key.	38	Integer	mandatory		No
2	targetId	It refers to the target videoId	38	Integer	mandatory		No
3	coverId	It refers to the cover videoId	38	Integer	mandatory		No
4	userId	userId is the foreign key which references table user1d	38	Integer	mandatory		No
5	encryptedId	It refers to the encrypted video id	38	Integer	mandatory		No
6	status	The status of the parcel is set and changed by the manager.	20	CHAR	mandatory		No

CHAPTER 3

PERFORMANCE ANALYSIS

3.1 TESTING ANALYSIS

Testing is the stage of implementation that is aimed at ensuring that the system works accurately and efficiently before the live operation commences. Testing is vital to the success of the system. System testing makes the logical assumption that if all the parts of the system are correct, then the goal will be successfully achieved. A series of testing are done for the proposed system before the system is ready for the user acceptance testing.

FOR LOGIN PAGE:

1. To check whether username and password fields are parsed well.
2. To check whether the page redirects to the admin page when logging in as an admin.
3. To check whether the page redirects to the welcome page when logging in as a user.
4. To check whether error message “username does not exist” is displayed in red color while logging in with wrong username.
5. To check whether error message “password is incorrect” is displayed in red color while logging in with wrong password.

FOR SIGN UP OF THE USER:

1. To check whether signup form fields are rendered.
2. To check whether name field is not accepting numbers.
3. To check on entering different passwords "Passwords do not match" error is shown.
4. To check whether Email id accepted is of the form "characters@characters.domain".
5. To check whether password field matches with confirm password field.
6. Check whether the username entered hasn’t been taken already

7. Check whether the mobile no is of 10 digits exactly

FOR ENCRYPTION PAGE:

1. To check whether the videos uploaded are of the correct format as required.
2. To check whether the duration and frames are valid for the video
3. To check whether the encryption key is given

FOR DECRYPTION PAGE:

1. To check whether the videos uploaded are in correct format.
2. To check whether the encryption key entered is correct
3. If the key is incorrect the error message is displayed
4. To check whether the action performing by admin is displaying in database as well.

FOR FORGOT PASSWORD PAGE:

1. To check whether the username entered exists
2. To check whether the security question and answer stored in the database match the ones given by the user.
3. Check that whether the new password and the confirm password match.

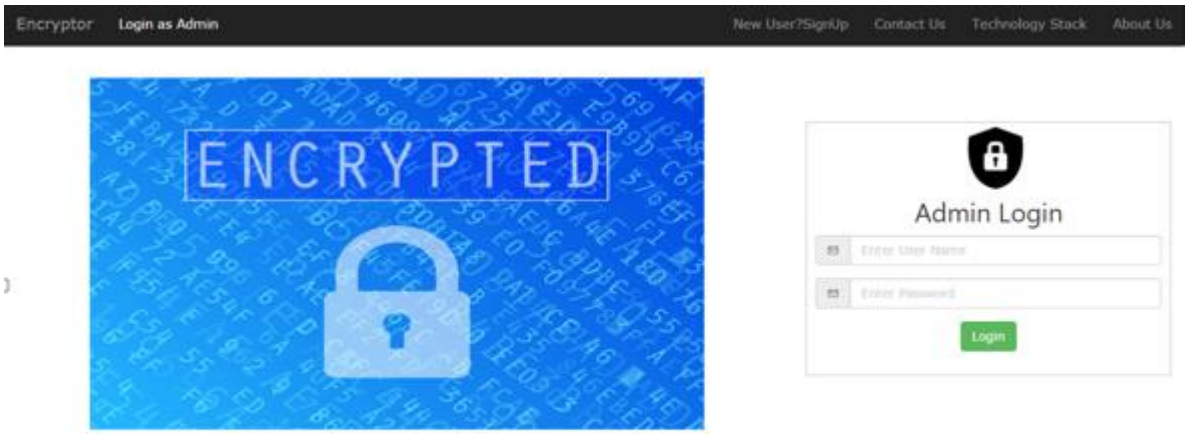
FOR TECHNOLOGY AND ABOUT US PAGE:

1. Both the pages should be displayed in single page application
2. The technology should display all the used technologies
3. The about us page should display the picture rounded with phone no.
4. The pictures when hovered upon should be colored highlighted

3.2 DYNAMIC PAGE VIEWS

SCREENSHOTS

Admin Login:

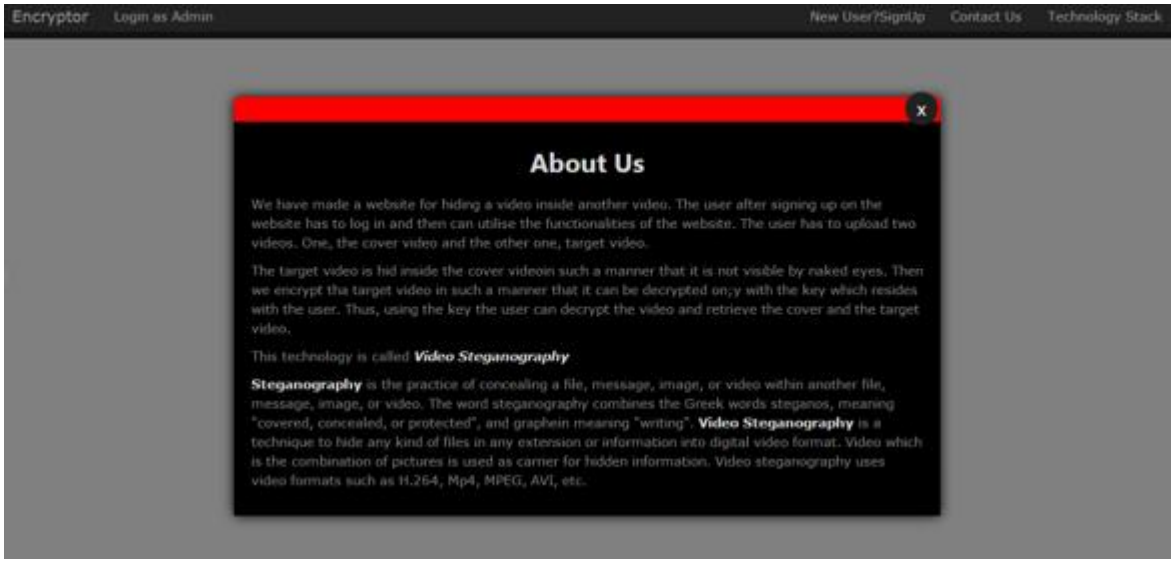


Screenshot: 1

User Login:

Screenshot: 2

About us:

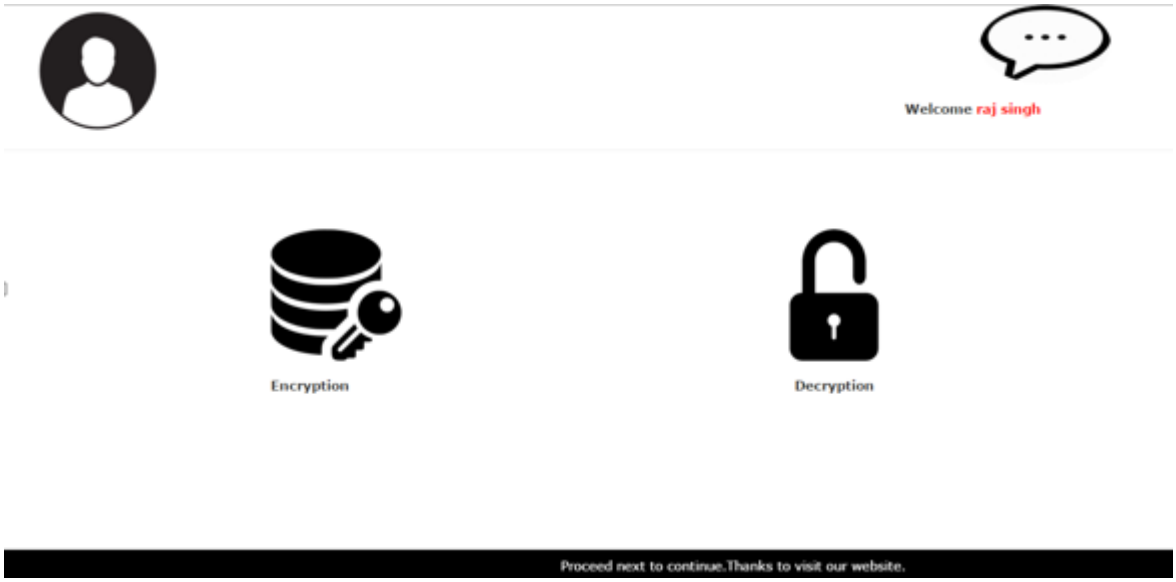


Screenshot: 3

Technology Stack:

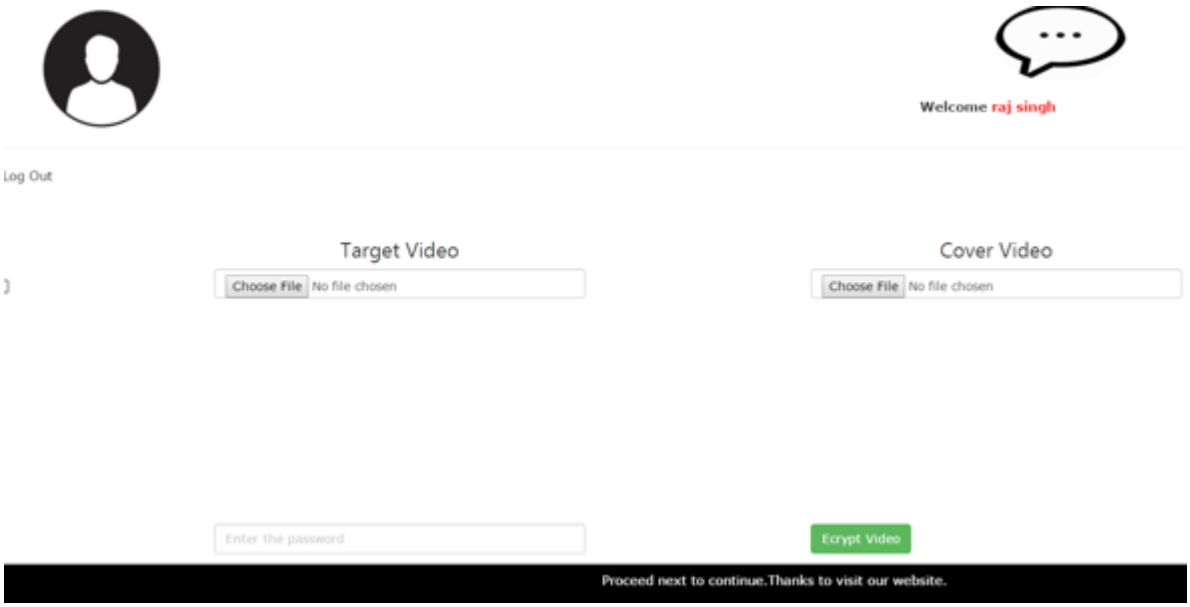
Screenshot: 4

Welcome page:



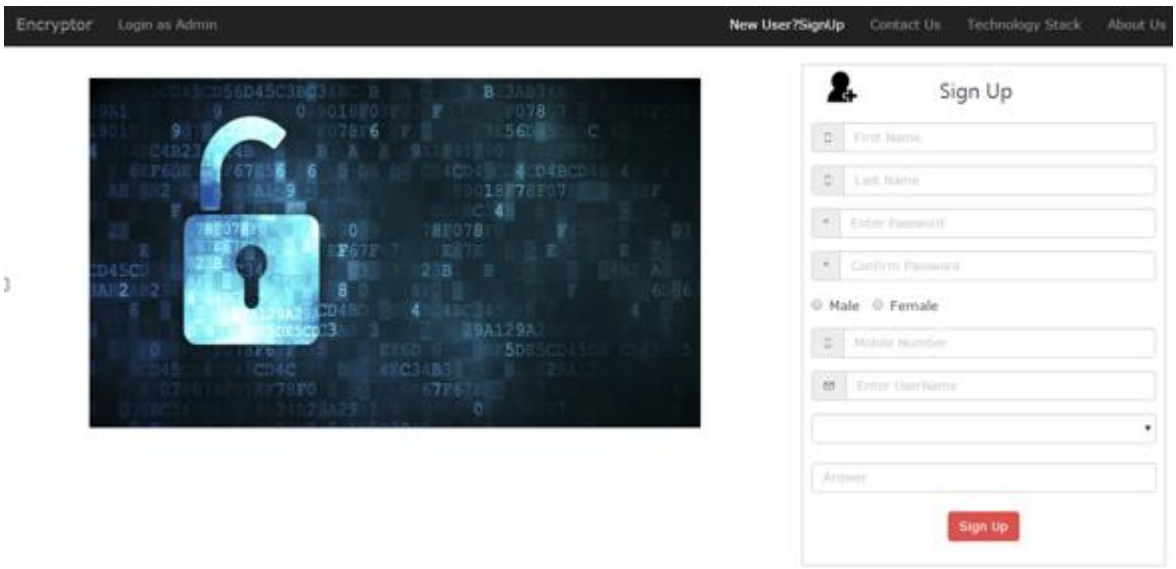
Screenshot: 5

Encryption page:



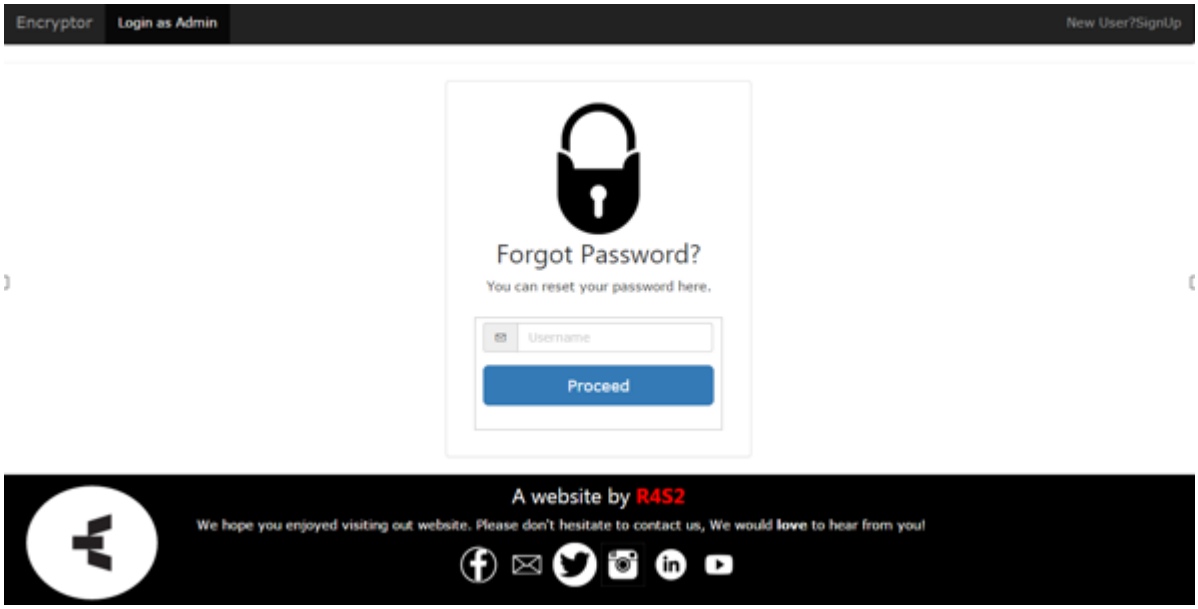
Screenshot: 6

Signup page:



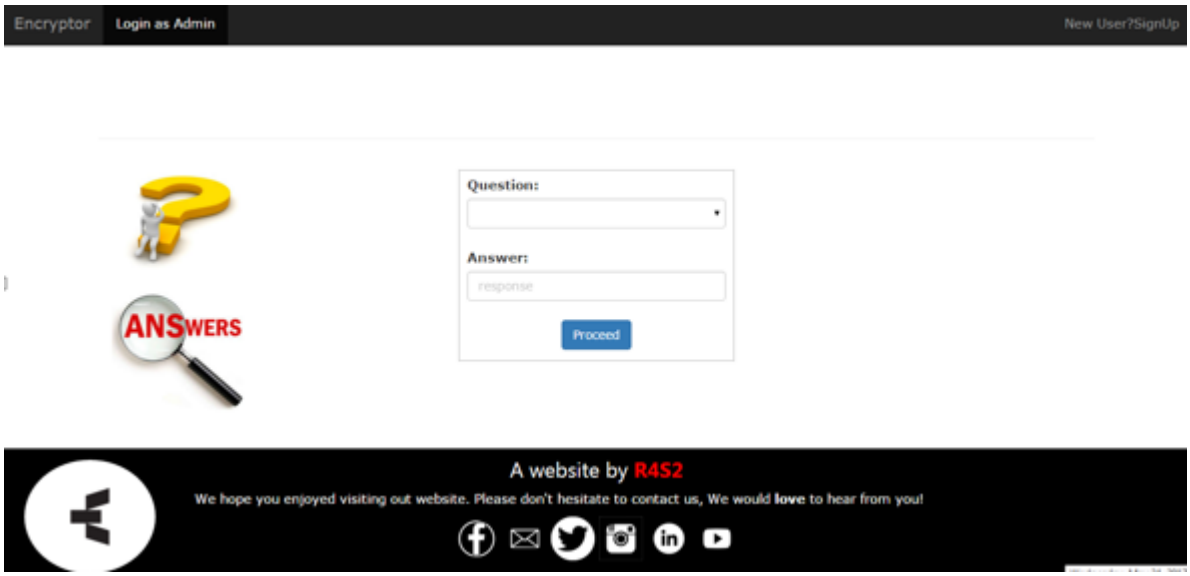
Screenshot: 7

Forgot password page:



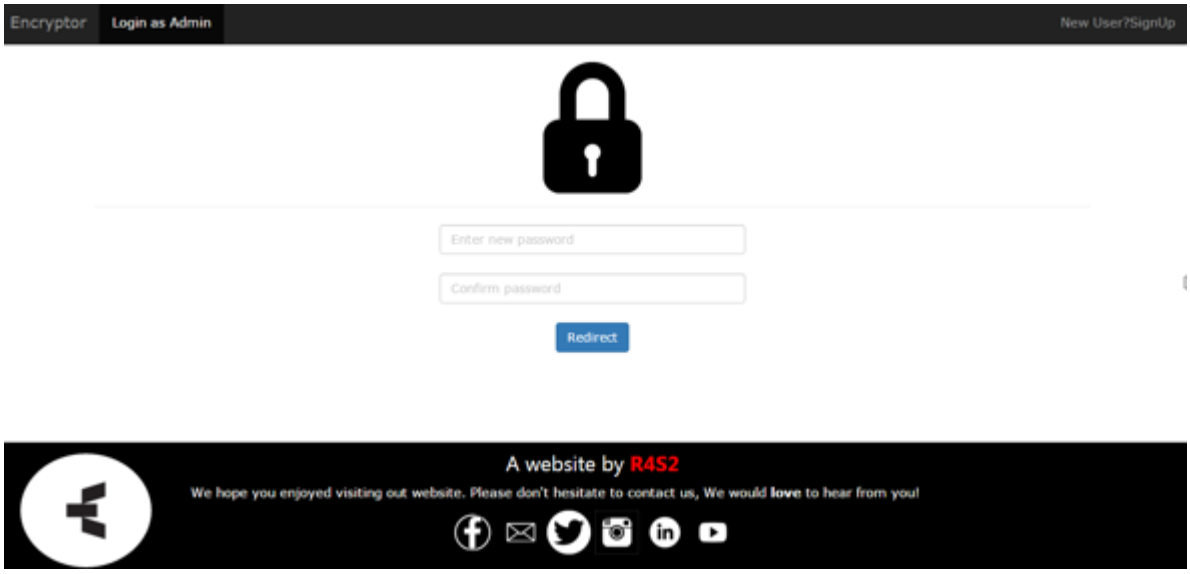
Screenshot: 8

Secret question page :



Screenshot: 9

Reset password page:



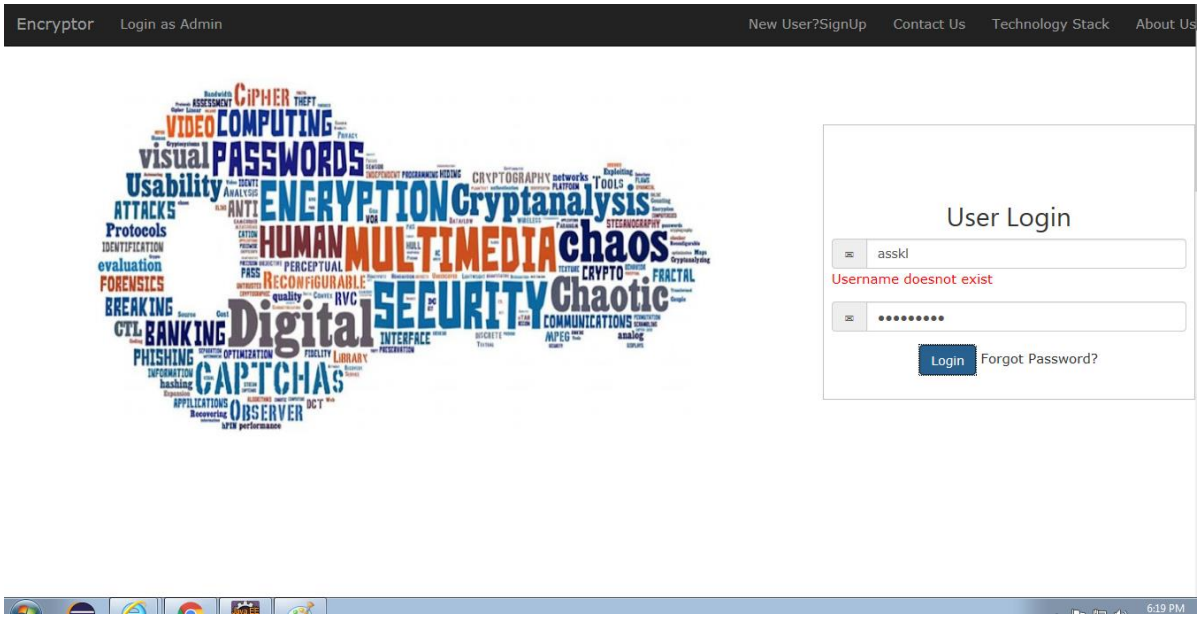
Screenshot: 10

Contact us page:

Screenshot: 11

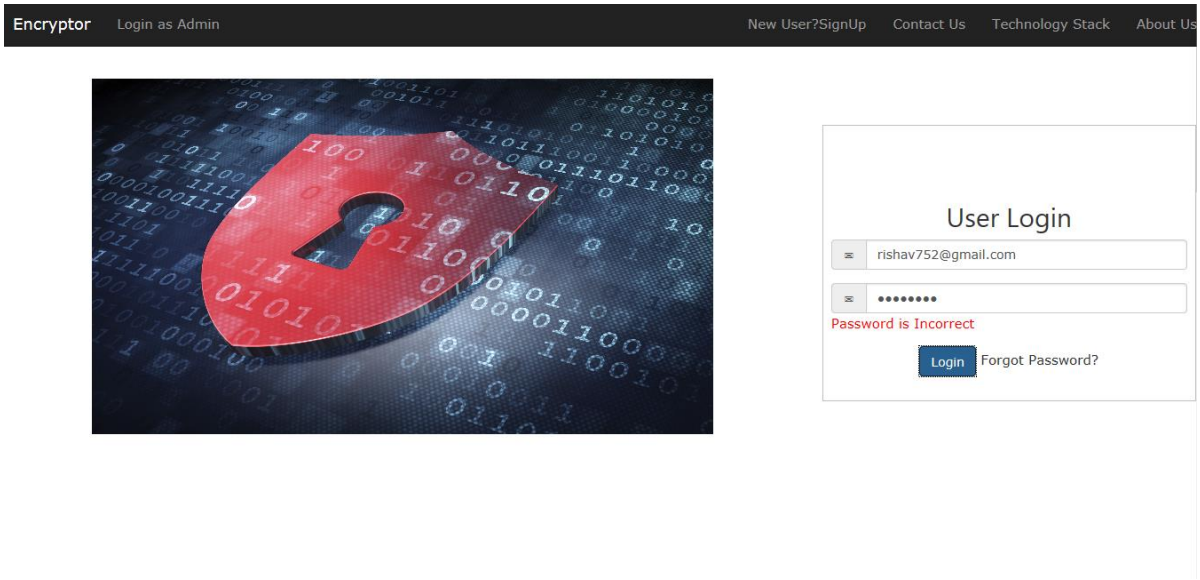
Dynamic performance of the website:-

Incorrect username:



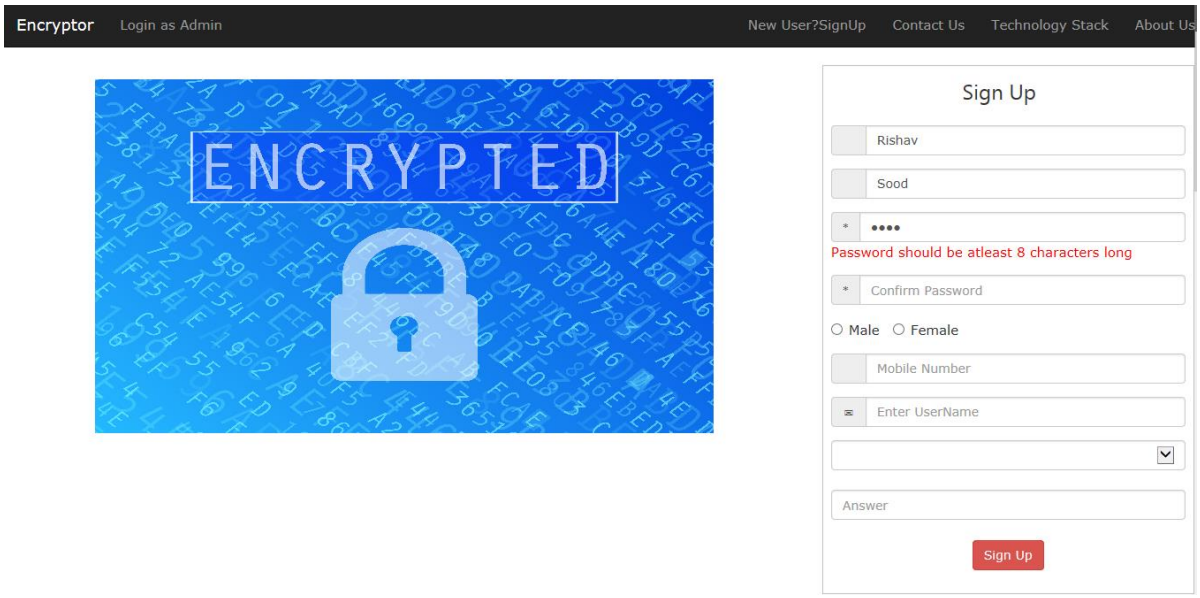
Screenshot: 12

Incorrect password:



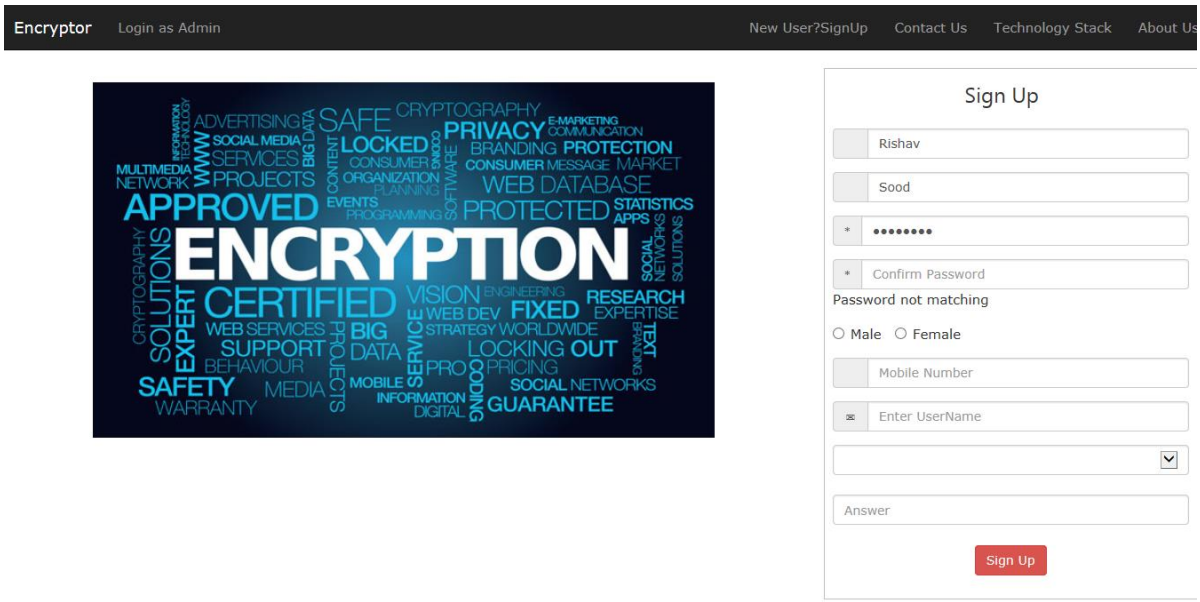
Screenshot: 13

Password Validation:



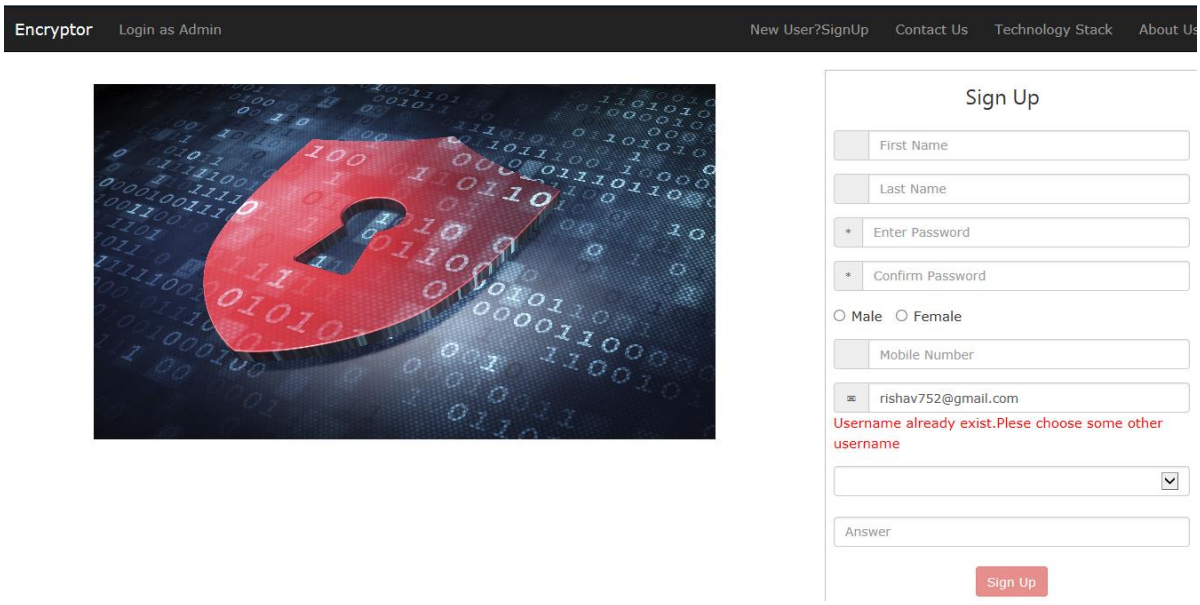
Screenshot: 14

Password and confirm password not matching:



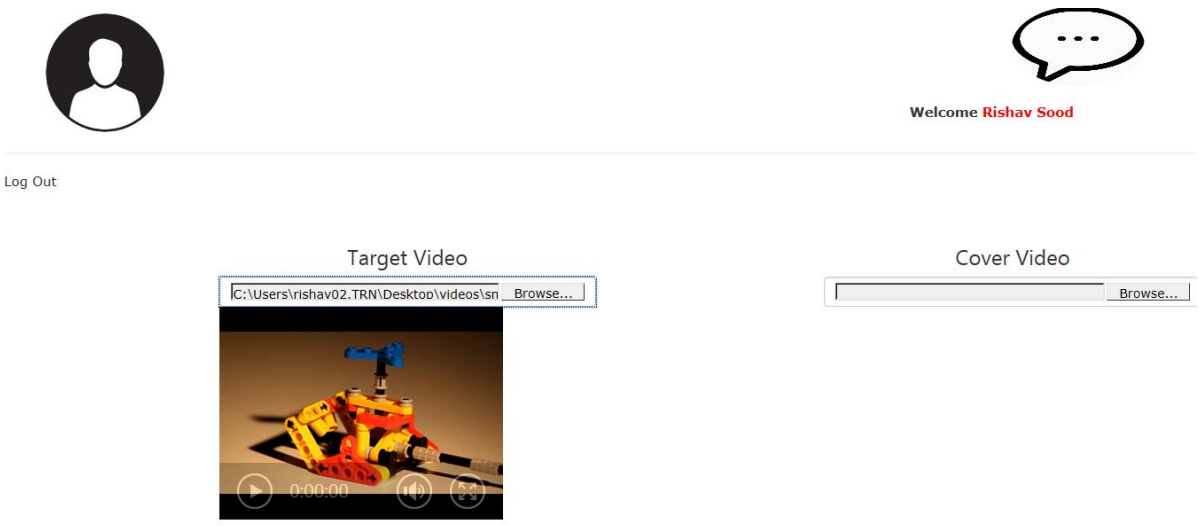
Screenshot: 15

Choosing username while signup:



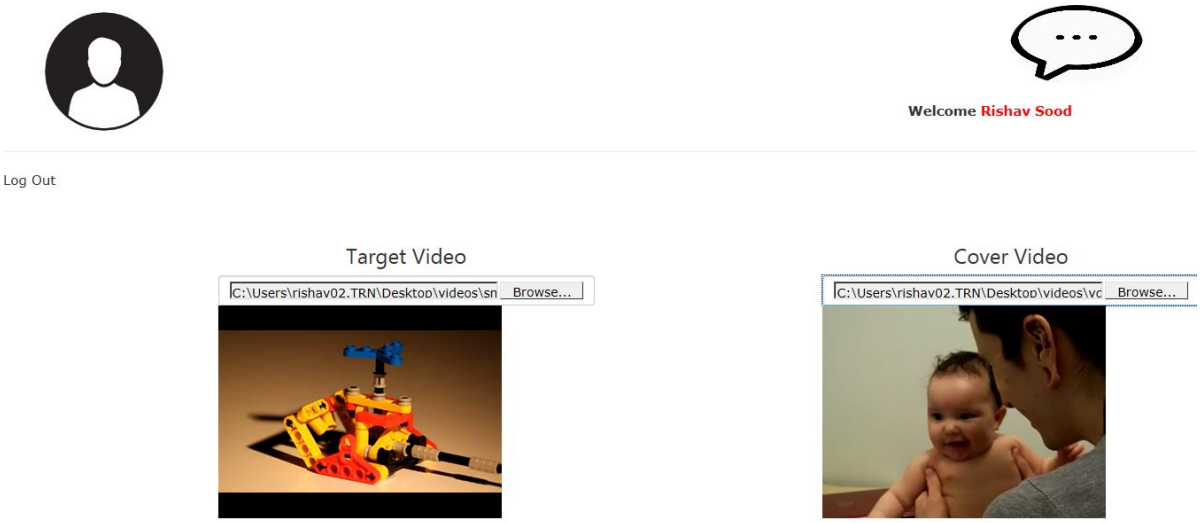
Screenshot: 16

Target video preview:



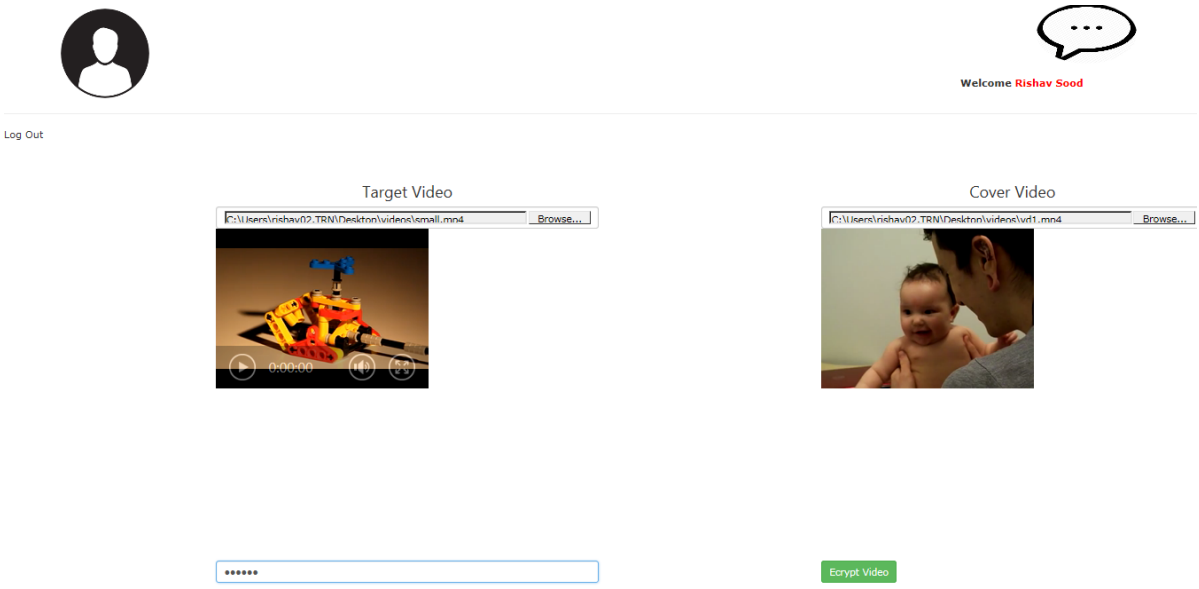
Screenshot: 17

Cover video preview:



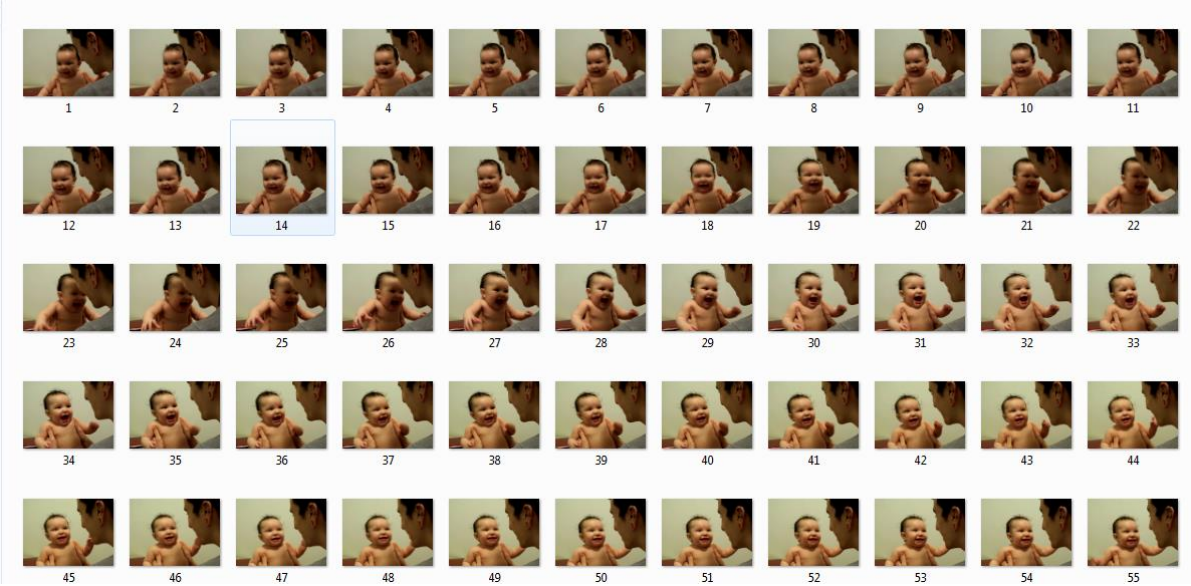
Screenshot: 18

Encryption key entry:



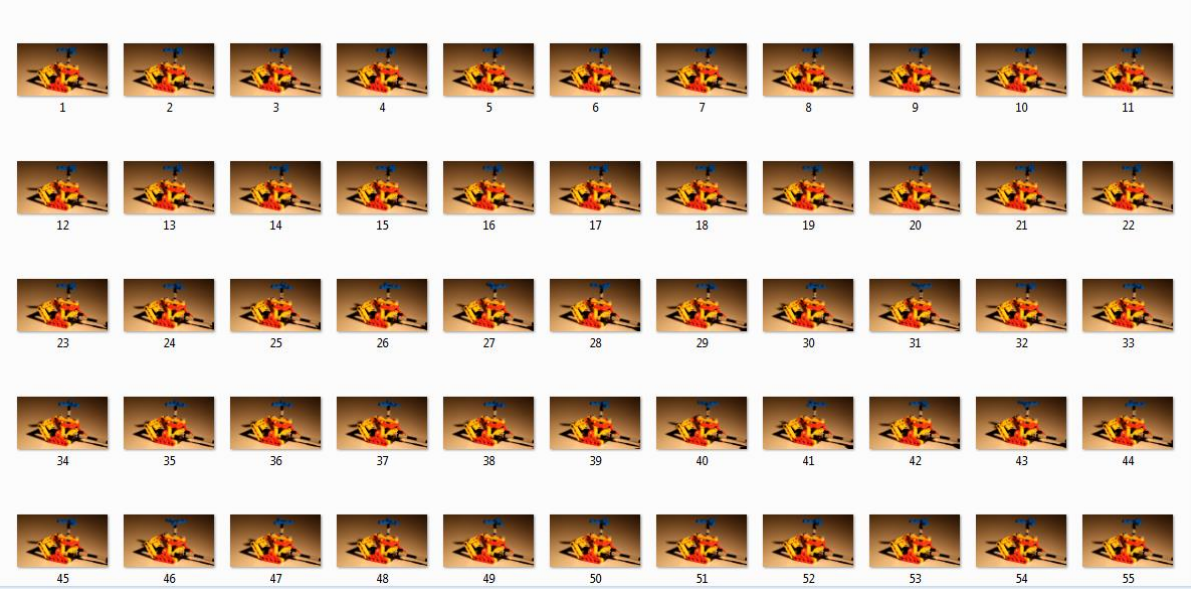
Screenshot: 19

Cover video frame creation:



Screenshot: 20

Target video frame creation:

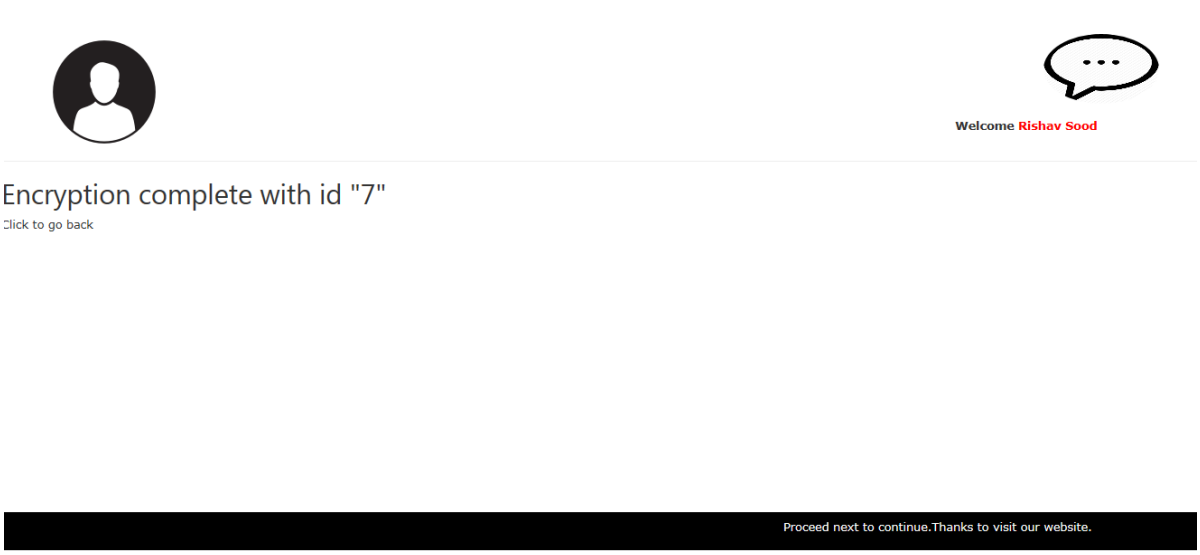


Screenshot: 21

Encrypted video frame creation:

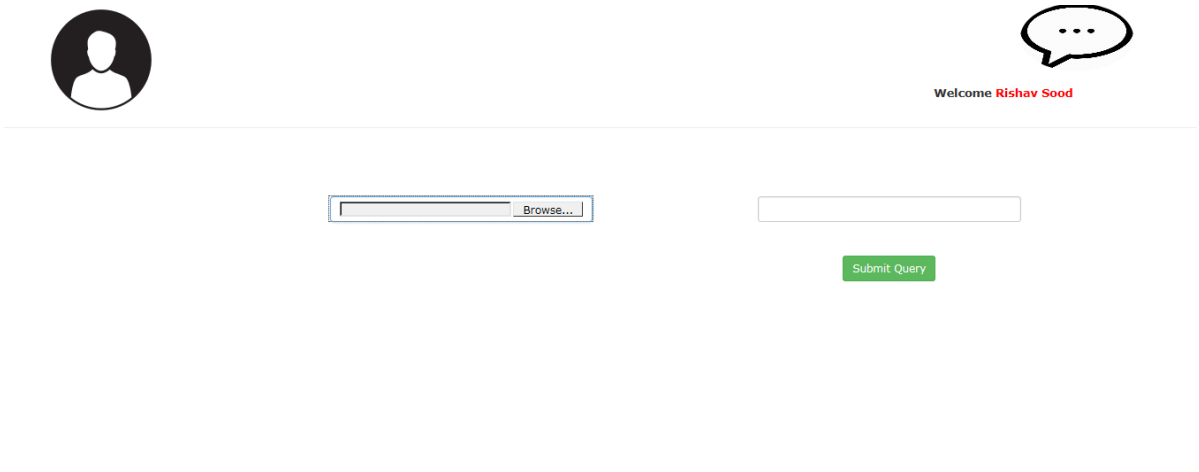
Screenshot: 22

Encrypted video Id creation:



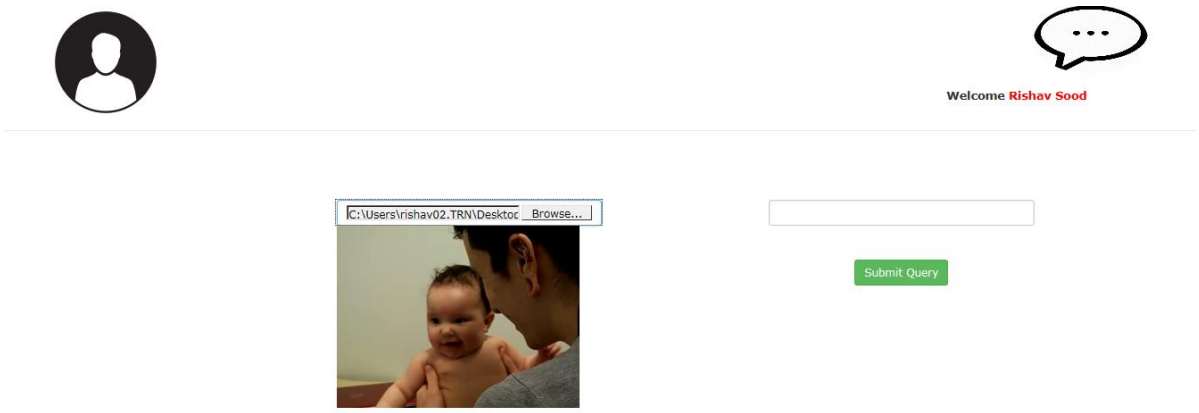
Screenshot: 23

Decryption video upload:



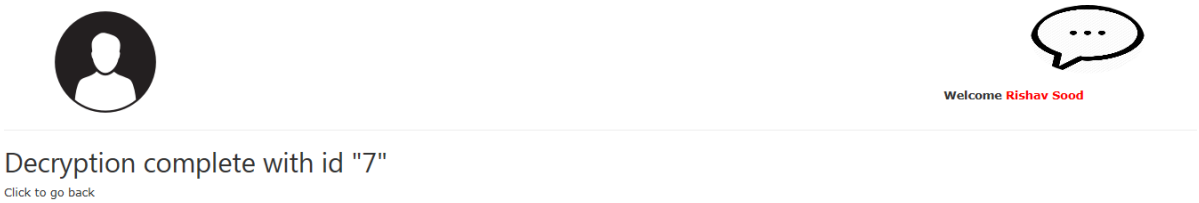
Screenshot: 24

Decryption video preview:



Screenshot: 25

Decryption Id creation:



Screenshot: 26

Decryption video frames creation:

Screenshot: 27

CHAPTER 4
CONCLUSION

It is concluded that the application works well and satisfy the users. The application is tested very well and errors are properly debugged. The application can be concurrently accessed by more than one user. Further enhancements can be made to the application so that the application functions appear attractive and in a more useful manner than the present one.

Every application has its own flaws. The project has covered almost all the requirements but still there has never been a limit to enhancement in number of features to any application. Further requirements and improvements can easily be done since the source code is mainly structured and modular in nature. Changing the existing modules or adding new modules can enhance improvements. Further enhancements that can be made to the application are:

1. Enhancement and beautification in the UI
2. A user account showing all their respective transactions
3. Details related to the performance of the encryption
4. Availability of decrypted videos to the admin
5. Previewing the videos and having a short playing frames in each account as soon as it is uploaded.
6. Showing the progress bar as the video gets encrypted.
7. Scaling the application for than a million users at a time.

4.1 FUTURE SCOPE

On the basis of the analysis of performance of our application, it can be easily scaled up to large extent to be used at industry level. By adding a few more resources it can be made online on the internet and thus can used worldwide.

Steganography has got a good lot of more scope in the coming years as information and data hiding is required by each one of us. The major leap of this application lies in the affect that the data hided is also encrypted using AES thus if it all someone recollects the bits illegitimately he/she can't read the data until they have the decryption key. It can be used in many ways so as the hide the confidential data which may affect the national security of a country and can be deployed in many more applications.