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An Application of ATM System using Fingerprint Authentication Model

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ABSTRACT

The main aim of this project is to provide secure banking system, by taking fingerprints as authorized identity at ATM/banks. The purpose of the project is to provide a secure and reliable environment to the customers for their banking transactions by providing a unique identity to every user using the FINGERPRINT identification technology. Identification and verification of a person today is a common thing, which may include door-locking system, safe box and vehicle control or even at accessing bank accounts via ATM, etc. which is necessary for securing personal information. The conventional methods like ID card verification or signature do not provide perfection and reliability. The systems employed at these places must be fast enough and robust too. Use of the ATM (Automatic Teller Machine) which provides customers with convenient banknote trading is facing a new challenge to carry on the valid identity to the customer. Since, in conventional identification methods with ATM, criminal cases are increasing making financial losses to customers. Fingerprint Based ATM is a desktop application where fingerprint of the user is used as a authentication. The fingerprint minutiae features are different for each human being so the user can be identified uniquely. Instead of using ATM card Fingerprint based ATM is safer and secure. There is no worry of losing your ATM card and no need to carry ATM card in your wallet. You just have to use your fingerprint in order to do any banking transaction. The user has to login using his fingerprint and he has to enter the pin code in order to do further transactions. The user can withdraw money from his account. Users can transfer money to various accounts by mentioning account number. In order to withdraw money the user has to enter the amount he wants to withdraw and has to mention from which account he wants to withdraw. The user must have an appropriate balance in his ATM account to do transactions. User can view the balance available in his respective account. The system will allow the user to view the last 5 transactions.

1. INTRODUCTION

1.1 OVERVIEW

Biometrics is the art of science and technology of measuring and analyzing biological data. If biometrics refers to technologies that measure and analysis human body characteristics, such as DNA, fingerprinting, eye retina and irises, voice pattern, facial pattern, and measurement for authentication purposes. The Biometrics identifier method provides several advantages over the traditional method and current method used in our daily life. Basically, concentrate on two functions, one is for identification and other verification. A modern ATM is typically made up of devices like CPU to control the user interface and devices related to transaction, magnetic or chip card reader to identify the customer, Pin pad, secure crypto processor generally within a secure cover. Display to be used by the customer for performing the transaction, function key button, record printer to provide the customer with a record of their transaction, to store the parts of the machinery requiring restricted access- vault, housing for aesthetics, sensors, and indicators. In this modern era there are many people using ATM. Fast development of banking has various advantages and disadvantages.

The main objective of this system is to develop an embedded system, which is used for ATM security applications. In this system, Bankers will collect the customer fingerprints while opening the accounts then customer will only access ATM machine. The working of these ATM machine is when customer place finger on the fingerprint module it displays the name of the customer on the LCD connected to the micro controller. If the user does not have a account activated by a fingerprint initially it does not allow the user to do transactions. Nowadays, using the ATM (Automatic Teller Machine) which provides customers with convenient banknote trading is very common. However, financial crime cases have risen repeatedly in recent years; a lot of criminal's tampers with the ATM terminal and steal user's credit card and password by illegal means. Once a user's bank card is lost and the password is stolen, the criminal will draw all cash in the shortest time, which will bring enormous financial losses to customer. How to carry on the valid identity to the customer becomes the focus in current financial circle. Traditional ATM systems authenticate generally by using the credit card and the password, the method has some defects. Using credit card and password cannot verify the client's identity exactly. In recent years, the algorithm that the fingerprint recognition continuously updated, which has offered new verification means for us, the original password authentication method combined with the biometric identification technology verify the clients' identity better and achieve the purpose that use of ATM machines improve the safety effectively.

1.2 EXISTING SYSTEM

We are using ATMs in our country for all our banking activities. An automated teller machine (ATM) is an electronic telecommunications device that enables customers of financial institutions to perform financial transactions, such as cash withdrawals, deposits, transfer funds, or obtaining account information, at any time and without the need for direct interaction with bank staff. On most modern ATMs, customers are identified by inserting a plastic ATM card (or some other acceptable payment card) into the ATM, with authentication being by the customer entering a personal identification number (PIN), which must match the PIN stored in the chip on the card (if the card is so equipped), or in the issuing financial institution's database. Using an ATM, customers can access their bank deposit or credit accounts in order to make a variety of financial transactions such as cash withdrawals, check balances, or credit mobile phones. ATMs can be used to withdraw cash in a foreign country. If the currency being withdrawn from the ATM is different from that in which the bank account is denominated, the money will be converted at the financial institution's exchange rate.

1.3 PROPOSED SYSTEM

We are using ATMs in our country for all our banking activities. An automated teller machine (ATM) is an electronic telecommunications device that enables customers of financial institutions to perform financial transactions, such as cash withdrawals, deposits, transfer funds or obtaining account information, at any time and without the need for direct interaction with bank staff. In our proposed system we are introducing a fingerprint sensor in which when a user scans their finger, if that user is valid or not. A biometric authentication system seems to be an excellent solution to authentication problems; however biometric authentication has some weaknesses. Biometrics is a rapidly evolving technology that is being widely used in forensics, such as criminal identification and prison security, and that has the potential to be used in a large range of civilian application areas. Biometrics can be used to prevent unauthorized access to ATMs, cellular phones, smart cards, desktop PCs, workstations, and computer networks. In automobiles, biometrics can replace keys with keyless entry devices. There are two main objectives of this paper, as follows: - 1. To integrate the fingerprinting in access control for ATM system. 2. To propose a framework for the ATM system using fingerprint verification.

2. Software Design

System design is the second step in the system life cycle, in which overall design of the system is achieved. The functionality of the system is designed and studied in this phase. The first step is designing of program specification. This determines the various data inputs to the system, data flow and the format in which output is to be obtained. Design phase is a transmission phase because it is a transition from user-oriented document to computer data. The activity in the design phase is the allocation of functions to manual operations, equipment and computer programs. Flow charts are prepared in the study time and is decomposed until all functions in the system perform evidently.

Design is a multi-step process that focuses on data structures, software architecture, procedural details (algorithms etc.) and links between the modules. The design process goes through logical and physical stages. In logical design reviews are made linking existing system and specification gathered. The physical plan specifies any hardware and software requirement, which satisfies the local design. Modularization of task is made in this phase. The success of any integrated system depends on the planning of each fundamental module. Usually, a project is revised in step by step sequence. Inter-phase management of such module is also important. Software design methodology changes continually as new methods, better analysis and broader understanding evolve. Various techniques for software design do exit with the availability of criteria for design quality. Software design leads three technical activities-design, code and test. Each activity transforms information, which validates the software. The design system converts theoretical solution introduced by the feasibility study into a logical reality.

3. Module Implementation

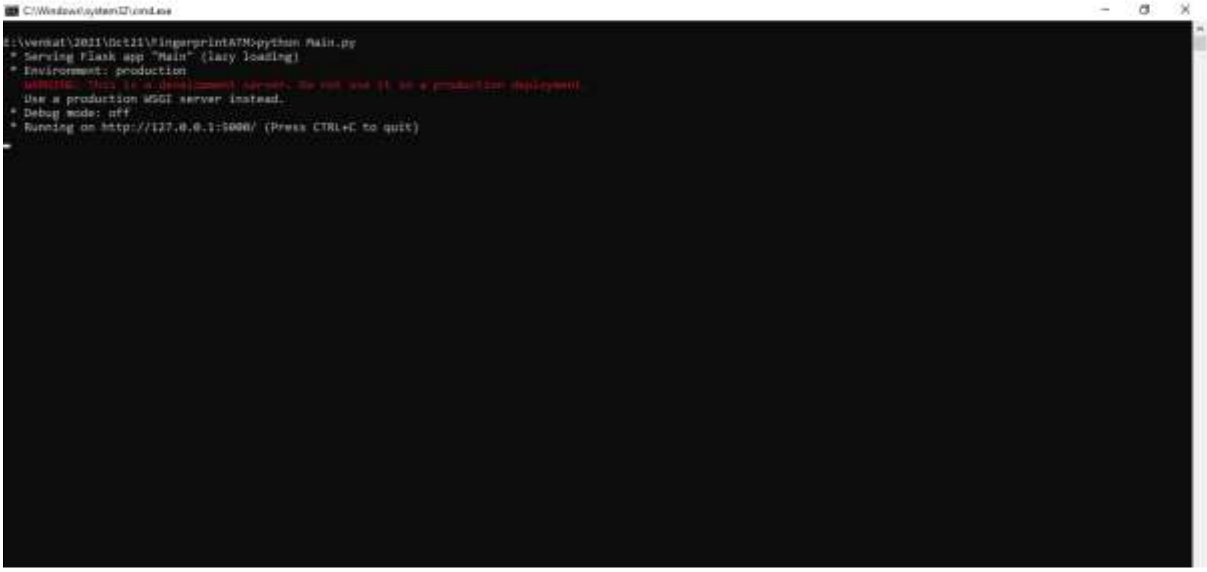
To implement this project, we have designed following modules.

1) Signup: using this module user can sign up with the application by using username, password and fingerprint image. All signup details will be saved in MYSQL database.
2) Login: using this module user can login to application by entering username, password and fingerprint image given at signup time to authenticate himself
3) Deposit: after successful authentication user can deposit amount and it will add to his account
4) Withdraw: using this user can withdraw amount if sufficient balance available
5) View Balance: using this module user can view available balance.

First create database in MYSQL by copying content from 'DB.txt' and then paste in MYSQL.

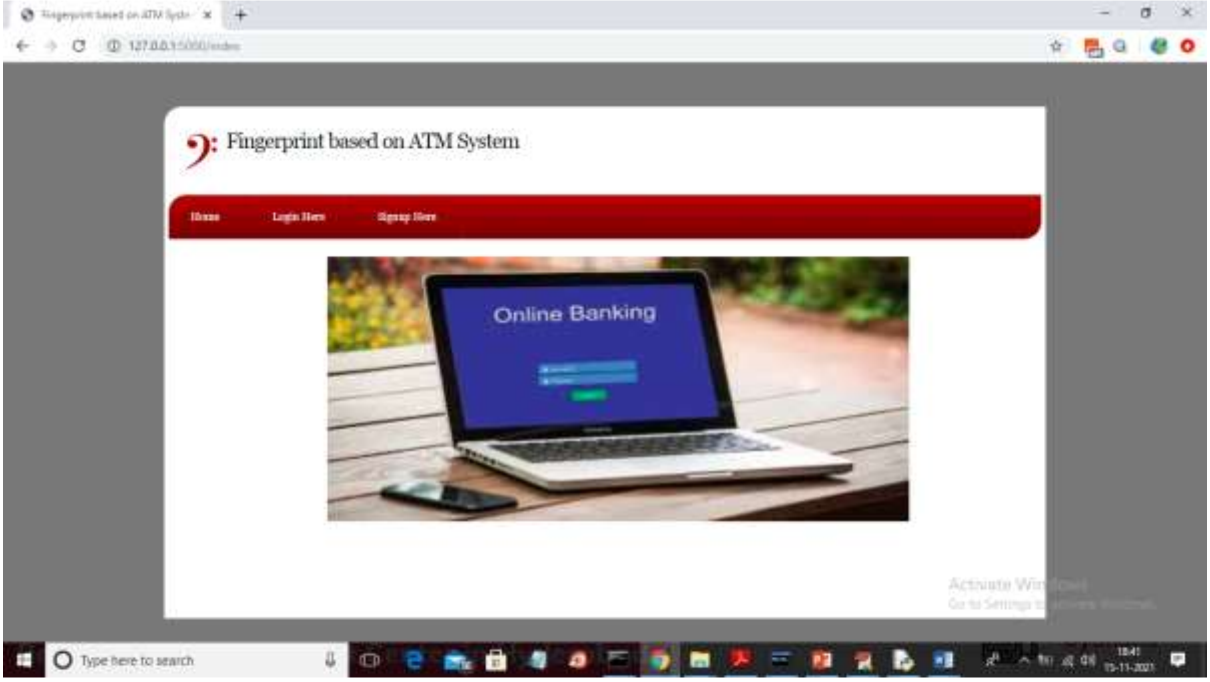
Results and Discussion

First, start python FLASK server.

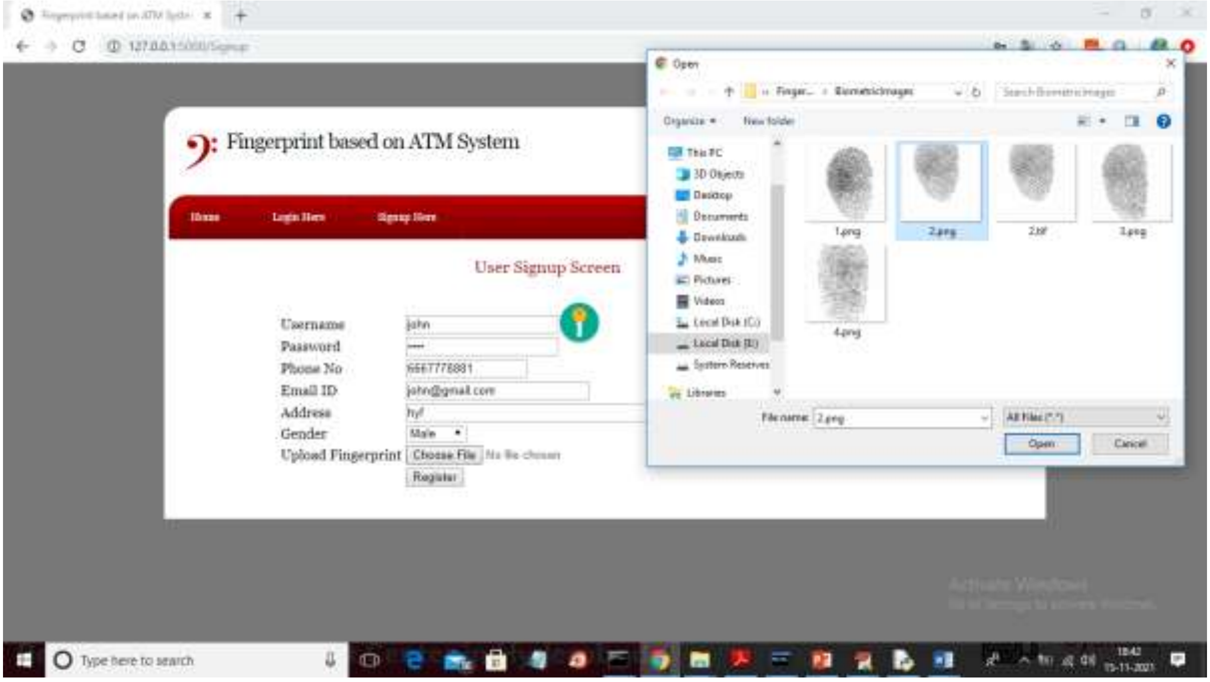


```
E:\venkat\2021\Oct21\FingerprintATM>python Main.py
 * Serving Flask app "Main" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

In above screen server started and now open browser and enter URL as ‘http://localhost:5000/index’ and press enter key to get below home page.



In above screen click on ‘Signup Here’ link to get below screen

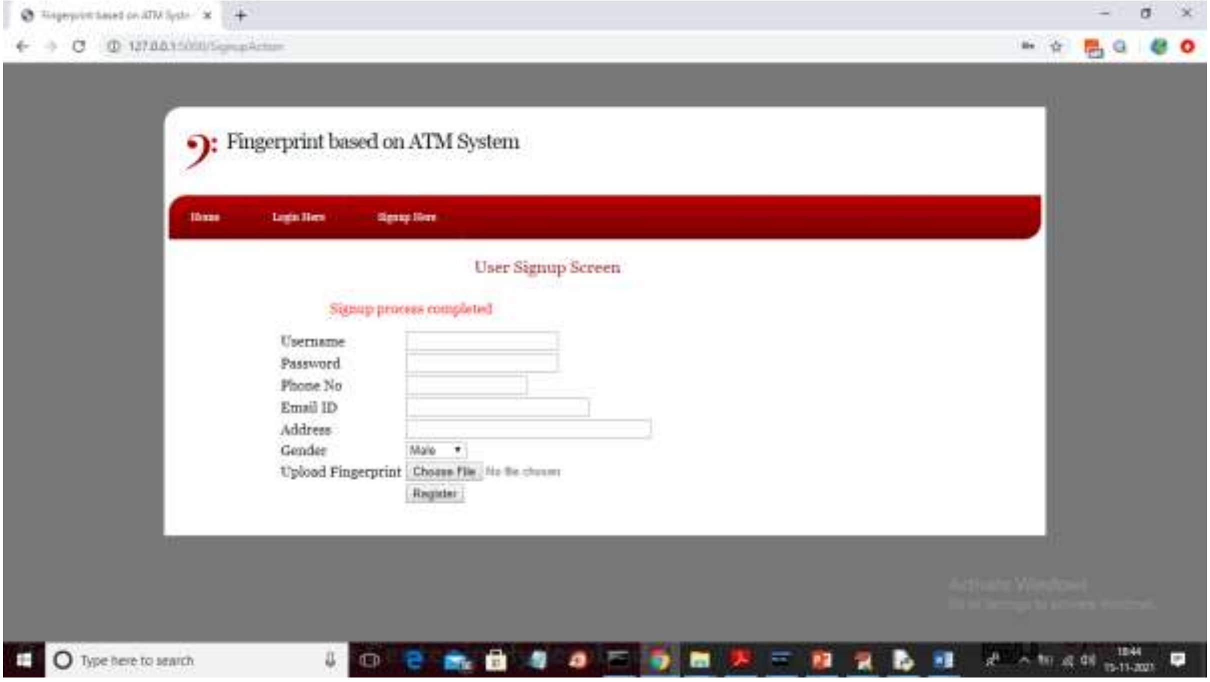


User Signup Screen

Username	john
Password	----
Phone No	6667776881
Email ID	john@gmail.com
Address	hyf
Gender	Male ▾
Upload Fingerprint	Choose File No file chosen
	Register

File name: 2.png All Files (*.*)

In above screen fill all signup details and then choose finger print image and then click on ‘Open’ button to load image and to get below screen

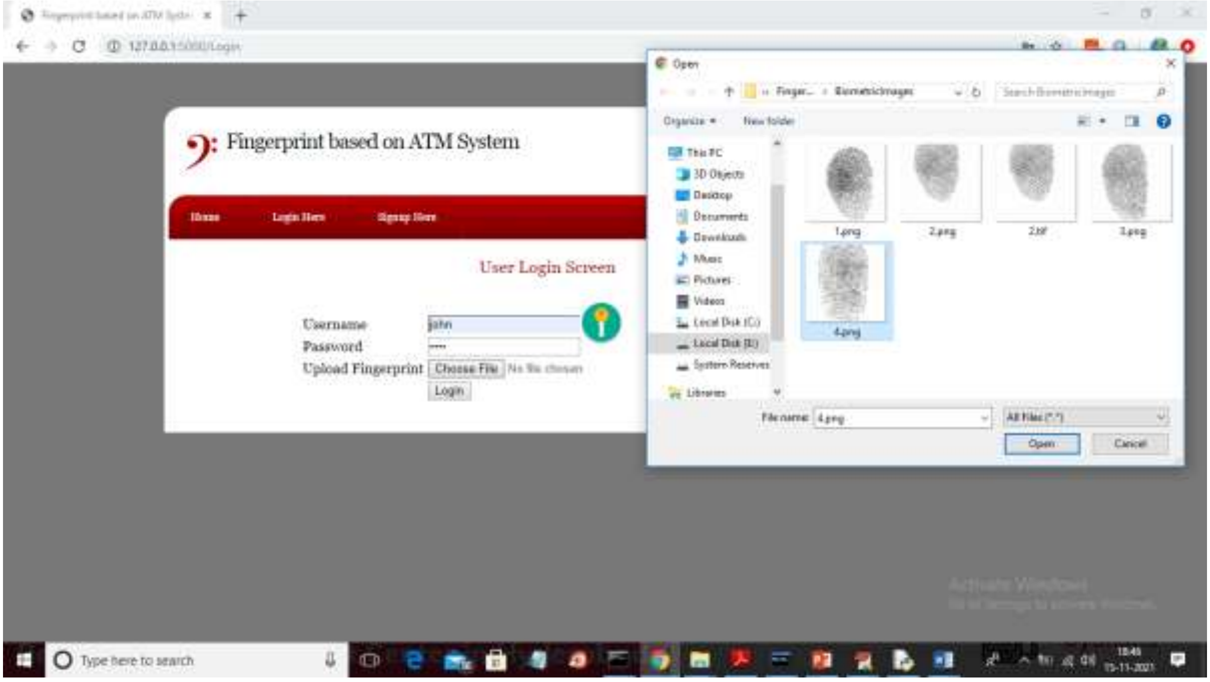


User Signup Screen

Signup process completed

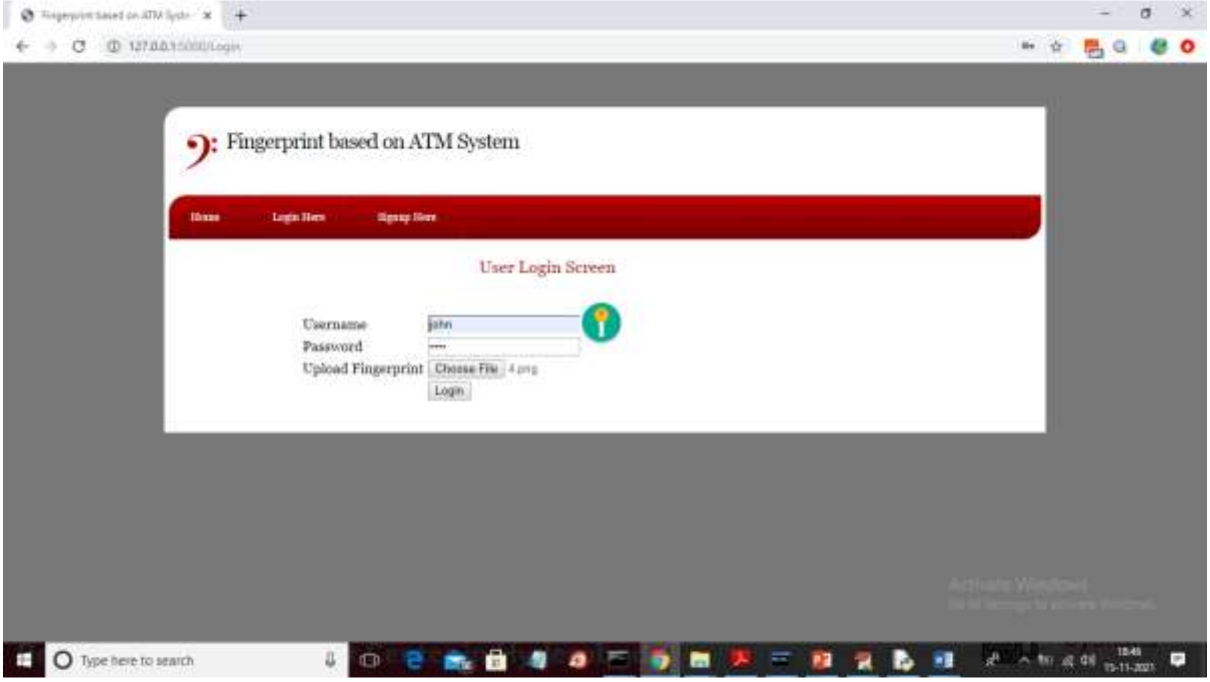
Username	
Password	
Phone No	
Email ID	
Address	
Gender	Male ▾
Upload Fingerprint	Choose File No file chosen
	Register

In above screen after pressing ‘Register’ button we will get message as ‘Signup process completed’ and now click on ‘Login Here’ link to get below screen



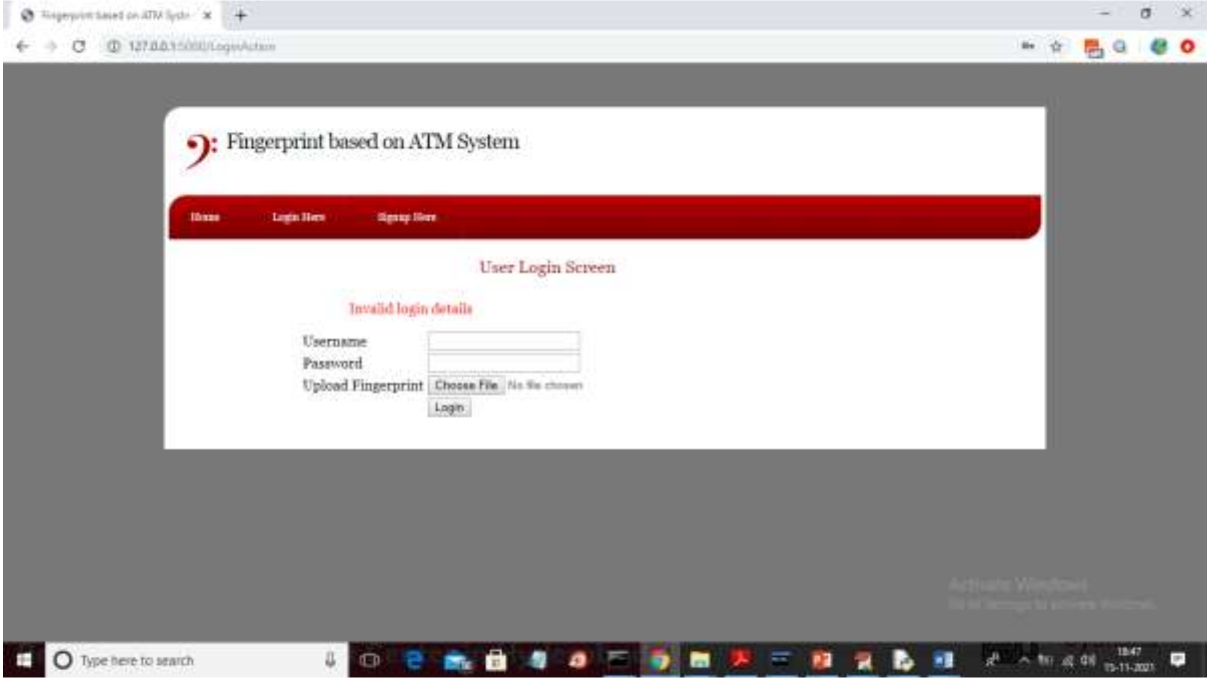
Username john
Password ****
Upload Fingerprint Choose File No file chosen
Login
File name: 4.png
All Files (*.*)

In above screen I am login and selecting wrong finger print as ‘4.png’ and then click on ‘Open’ button to get below screen



Username john
Password ****
Upload Fingerprint Choose File 4.png
Login

In above screen image loaded and now click on ‘Login’ button to get below output



Fingerprint based on ATM System

User Login Screen

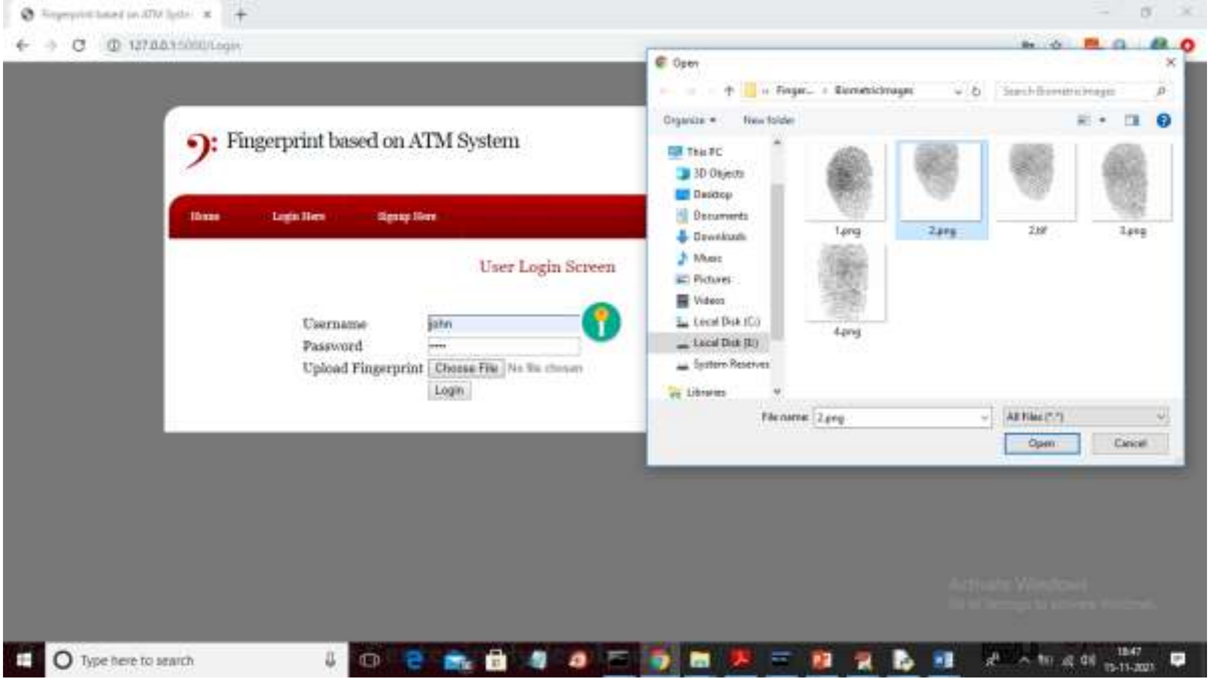
Invalid login details

Username

Password

Upload Fingerprint No file chosen

In above screen login is failed and now login with correct image



User Login Screen

Username john

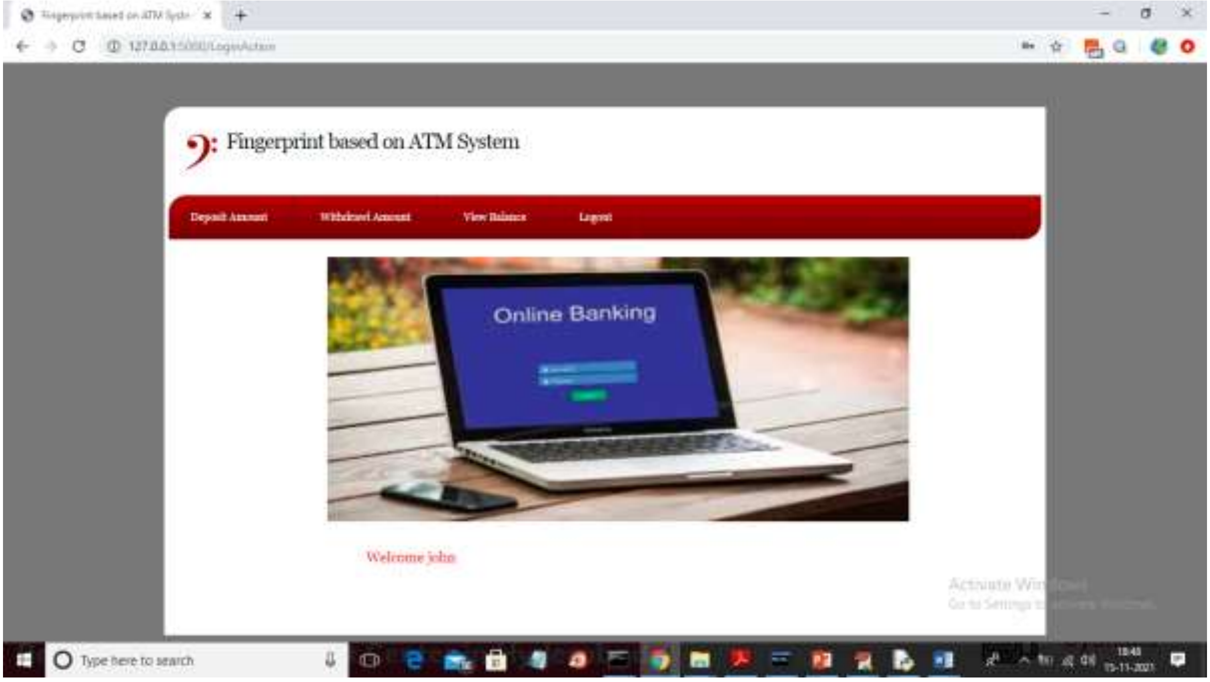
Password ••••

Upload Fingerprint No file chosen

File name: 2.png

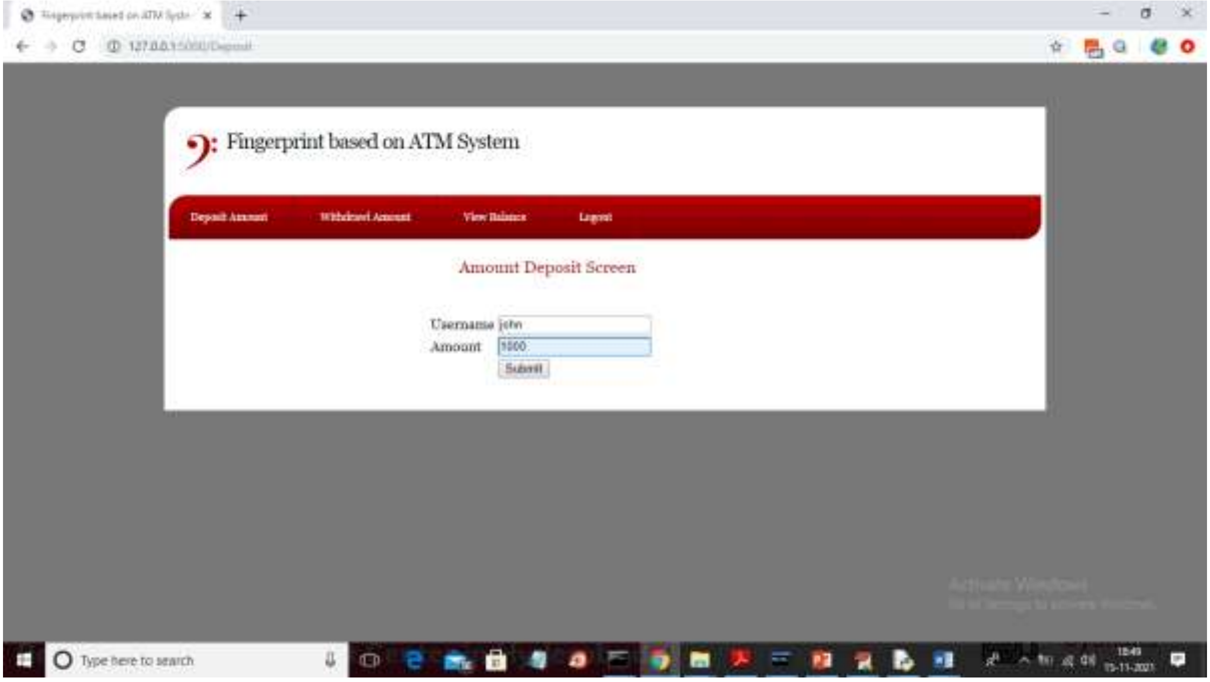
All Files (*.*)

In above screen now i am uploading correct image and press ‘Login’ button to get below output



Welcome john

In above screen user login is successful and we got deposit and with draw option. Now click on ‘Deposit Amount’ link to get below screen

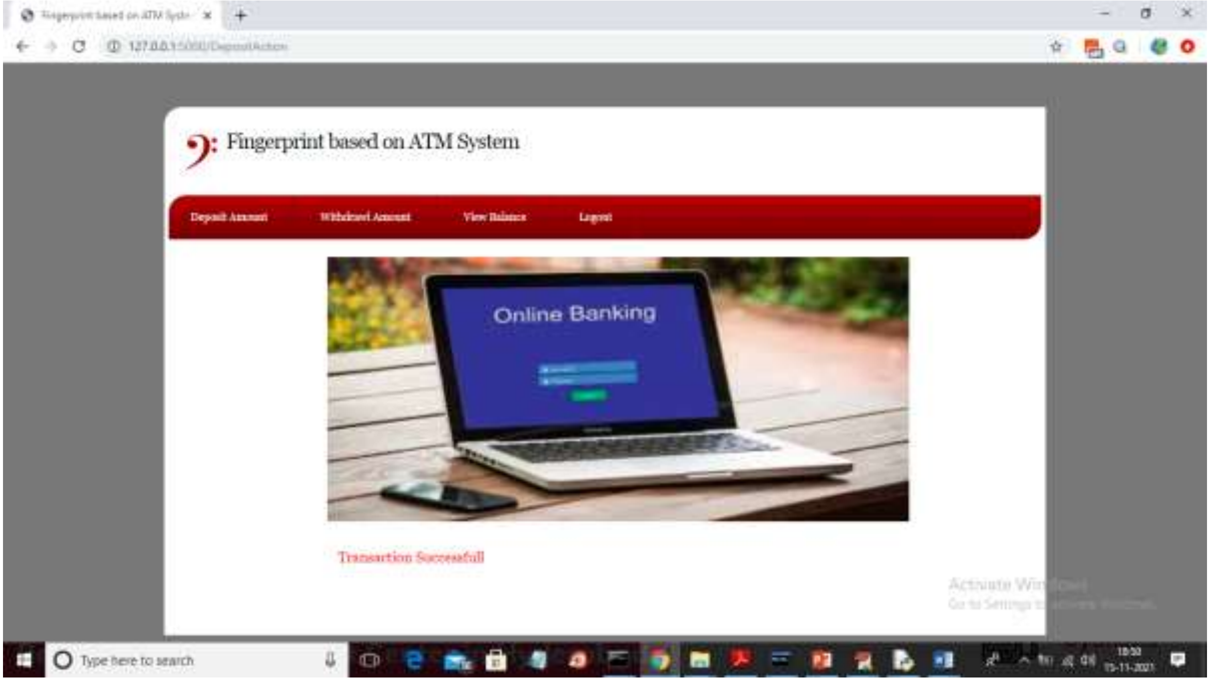


Amount Deposit Screen

Username john

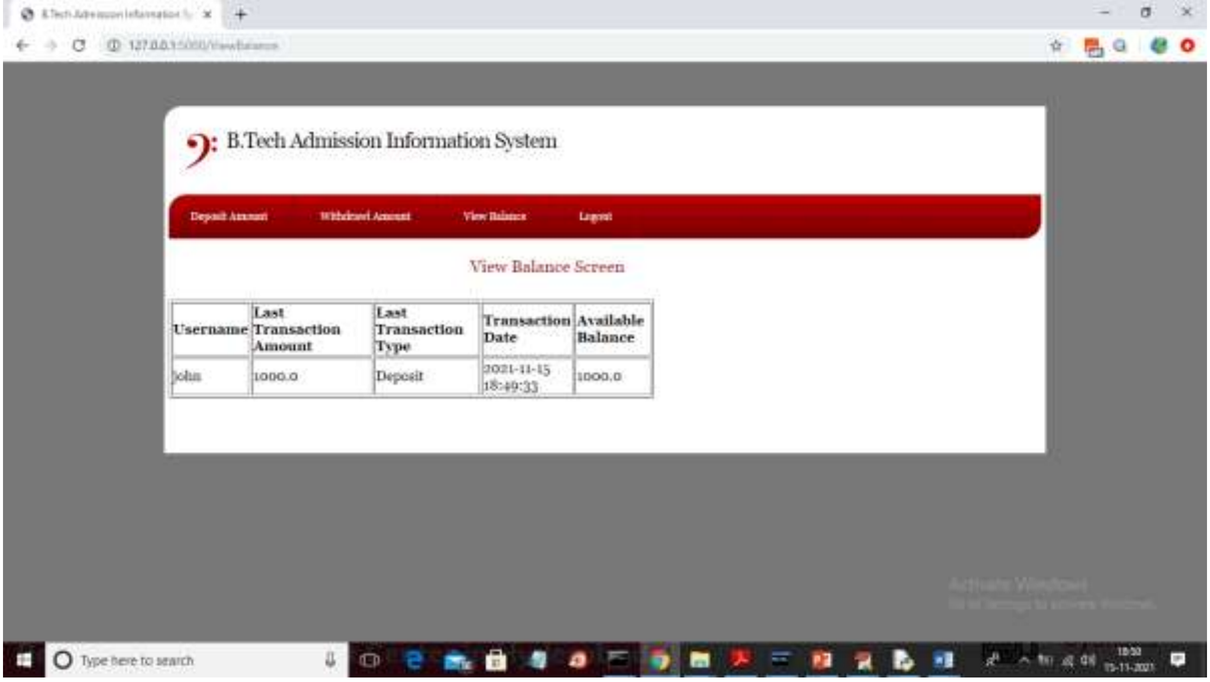
Amount 1000

In above screen username will display in default and now enter some amount and press ‘Submit’ button to complete transaction and will get below output



Transaction Successfull

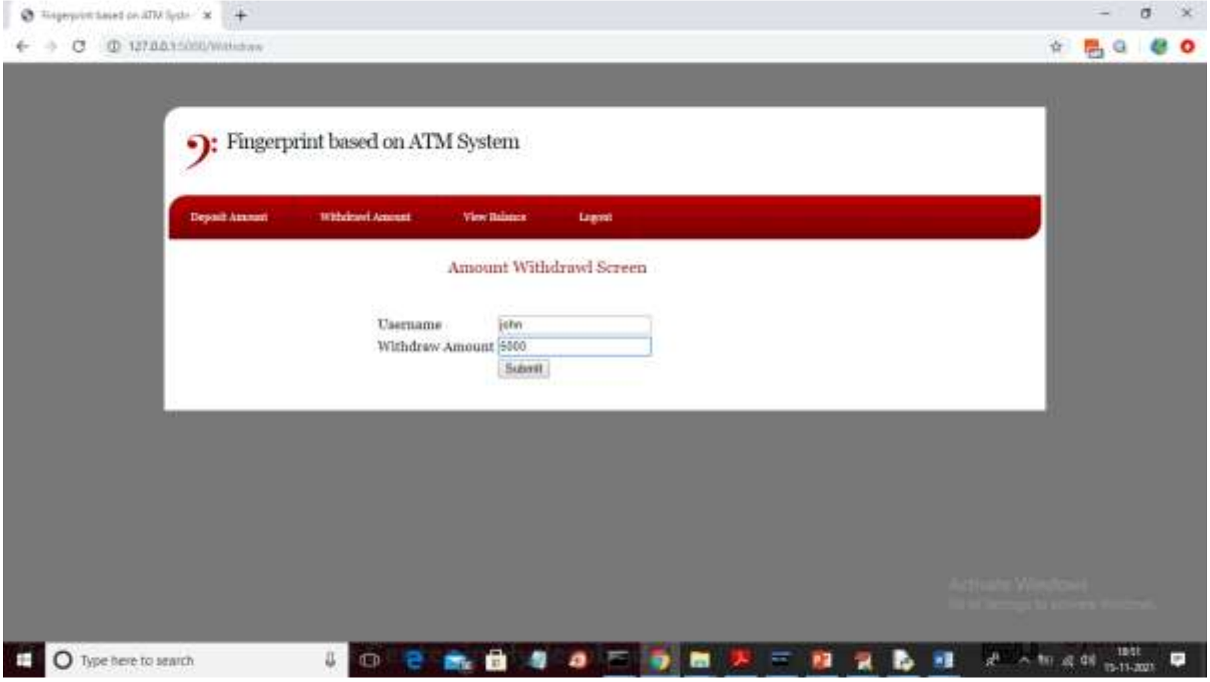
In above screen we can see transaction is successful and now click on 'View Balance' link to view balance



View Balance Screen

Username	Last Transaction Amount	Last Transaction Type	Transaction Date	Available Balance
john	1000.0	Deposit	2021-11-15 18:49:33	1000.0

In above screen deposit transaction is displaying and now click on 'Withdrawl Amount' link to get below screen



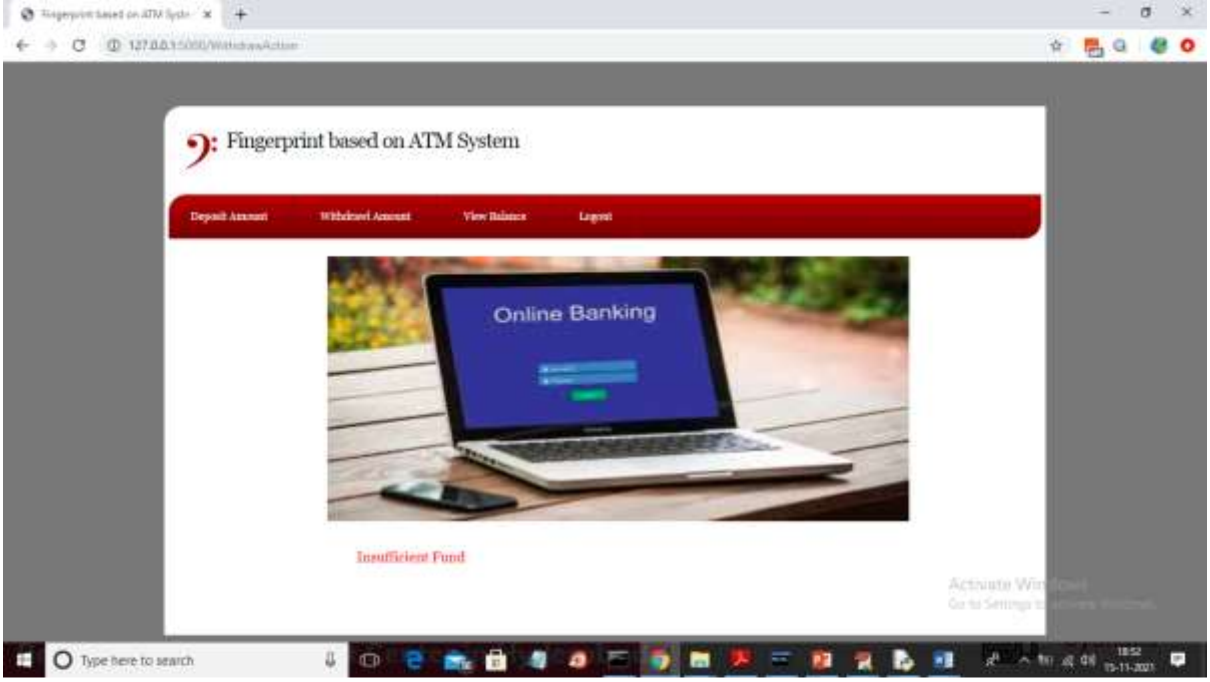
Fingerprint based on ATM System

Amount Withdrawl Screen

Username john

Withdraw Amount 5000

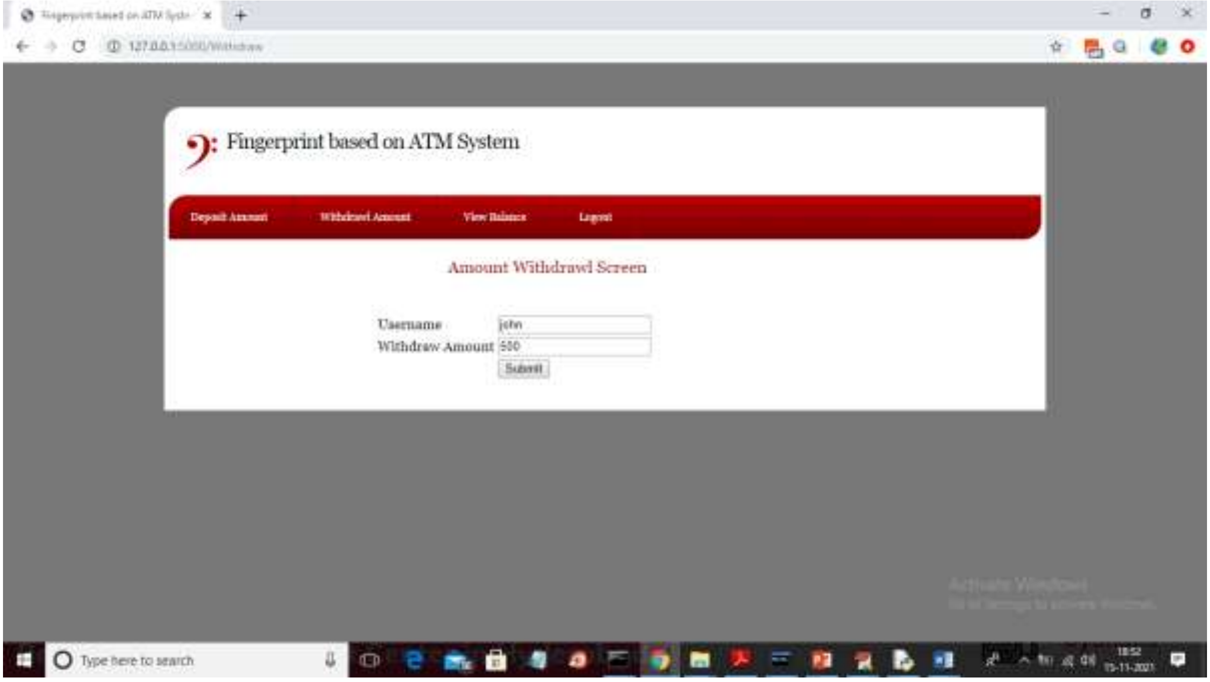
In above screen I am withdrawing amount larger than available amount to get below screen



Fingerprint based on ATM System

Insufficient Fund

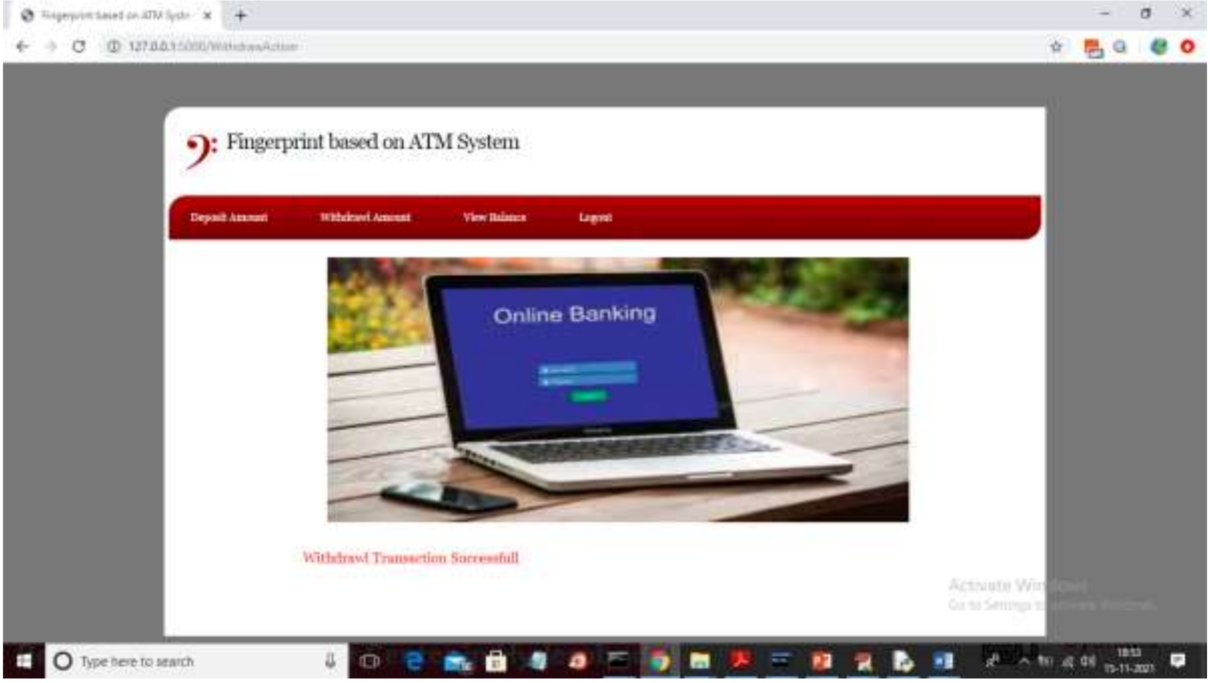
In above screen we can see 'Insufficient Fund' and now withdraw another amount



Amount Withdrawl Screen

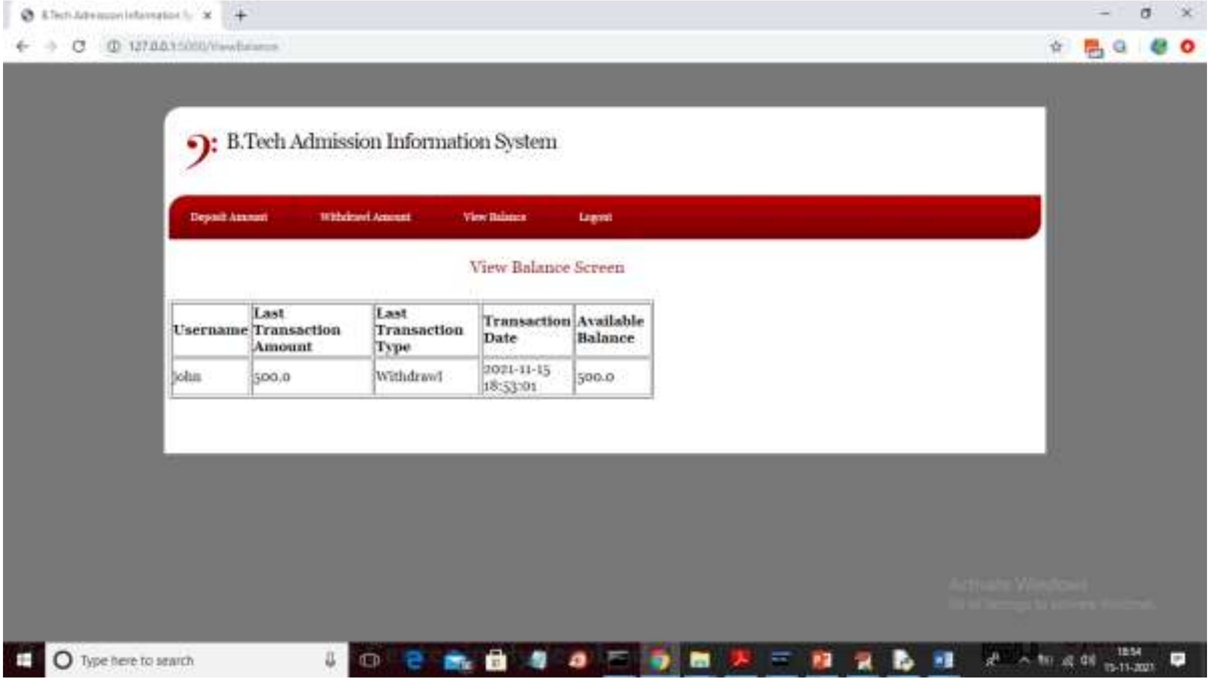
Username john
Withdraw Amount 500

In above screen 500 is withdrawing and press ‘Submit’ button to get below screen



Withdrawl Transaction Successfull

In above screen withdraw transaction successful and now check balance again


127.0.0.1:5000/ViewBalance
B.Tech Admission Information System
Deposit Amount
Withdrawl Amount
View Balance
Logout

View Balance Screen

Username	Last Transaction Amount	Last Transaction Type	Transaction Date	Available Balance
john	500.0	Withdrawl	2021-11-15 18:53:01	500.0

Now in above screen available balance is 500. Similarly, you can perform N number of transaction

5. CONCLUSION

In today's modern world, autonomous systems play an important role in our day-to-day life. As social computerization and automation have drastically increased, it can be seen evidently where the number of ATM centers increases rapidly. Most civilians use ATMs regularly. A good example can be a financial transaction, ease of money exchange etc. So there exists an important factor called security. The security features were enhanced largely for the stability and reliability of owner recognition. The whole system was built on fingerprint technology which makes the system safer, reliable and easy to use. As we know fingerprints are the most acceptable biometrics all over the world in identifying a person. Some governments in the world are still implementing fingerprints techniques to identify their citizens and the criminal from the scene of crimes in forensic work.

A lot of criminal's tampers with the ATM terminal and steal customers' card details by illegal means. Once the users' bank card is lost and the password is stolen, the users' account is vulnerable to attack. Traditional ATM systems authenticate generally by using a card (credit, debit, or smart) and a password or PIN which no doubt has some defects. The prevailing techniques of user authentication, which involves the use of either passwords and user IDs (identifiers), or identification cards and PINs (personal identification numbers), suffer from several limitations.

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