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Enhanced Security in Authentication Using QR Code

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Abstract: We are trying to make an attempt to take the conventional authentication method of using One Time Password (OTP) to next level. This method uses a technique which encrypts the IMEI code of the registered cell phone of customer and a randomly generated number into a Quick Response (QR) code. This code is scanned and decrypted using the customer's Android smart phone whose IMEI number has been already registered with the bank. After successful decryption user gets the Passcode which can be used to login.This ensures that every time user logs in with a different passcode and makes the whole process more secure. We are using .NET and Android technology for the front-end and MySQL database.
Keywords : Authentication, QR Code, Security, AES Algorithm, Encryption, Decryption.

I.   INTRODUCTION

Now a day's, almost all the things we are doing online (like Shopping, Banking, ccommunicating, etc.).While doing this, the major issue faced by end users as well as vendors is the security. Specifically speaking, authentication is the major security concern. Till date, we are using a system which relies on the OTP(One Time Password) sent to the user over cellular network. But this method fails when cellular network is not available and user wants to perform any transaction. So ,here we present this new methodology of authentication which relies on the use of a android based smart phone. This system aims at eliminating the use of cellular network in the authentication process and implementing two-factor authentication method using QR code to enhance the security. We are encrypting the passcode in the QR code such that this passcode will only be shown to the user who has registered IMEI number of his smart phone against his account number.

II.   EXISTING SYSTEM

Authentication system used by banking sector typically relies on One Time Password sent over cellular network. This method is requires working cellular network to send the OTP to user. So, when the user is in remote area where cellular network is not available and he wants to perform any banking activity then the system fails to authenticate the user and user can not access the online banking features.

III.   PROPOSED SYSTEM

The QR based authentication system lets the user input User Id and Password. if the user is authenticated then an encrypted QR code is shown on the screen which consit's of IMEI number of user registered mobile phone and randomly generated number.The user uses his phone to scan the QR code and if the encrypted IMEI number is same as the IMEI number of the device then user is authenticated and pass-code is displayed on the screen. Also, an additional feature is included in the system to help visually challenged people. In this feature, a visually challenged person uses his/her phone to scan the QR code and after the scan is completed the code is spoken out. He/She can enter the code via text-to-speech to the web application.

IV.   TECHNOLOGIES USED

A.   Asp. Net

ASP.NET is more than the next version of Active Server Pages (ASP); it is a unified Web development platform that provides the services necessary for developers to build enterprise-class Web applications. While ASP.NET is largely syntax-compatible with ASP, it also provides a new programming model and infrastructure that enables a powerful new class of applications.

B.   NET Framework

The .NET Framework is Microsoft's Managed Code programming model for building applications on Windows clients, servers, and mobile or embedded devices. Microsoft's .NET Framework is a software technology that is available with several Microsoft Windows operating systems.

In the following sections describes, the basics of Microsoft .Net Frame work Technology and its related programming models. C# is a language for professional programming. C# (pronounced C sharp) is a programming language designed for building a wide range of enterprise applications that run on the .NET Framework. The goal of C# is to provide a simple, safe, modern, object-oriented, high-performance, robust and durable language for .NET development. Also it enables developers to build solutions for the broadest range of clients, including Web applications, Microsoft Windows Forms-based applications, and thin- and smart-client devices.

C. Android

Here, we are using the smart-phones which run on android operating system as this is the most widely used operating system.Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input.

D. Microsoft SQL Server

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications

V.   STRUCTURE OF QR CODE
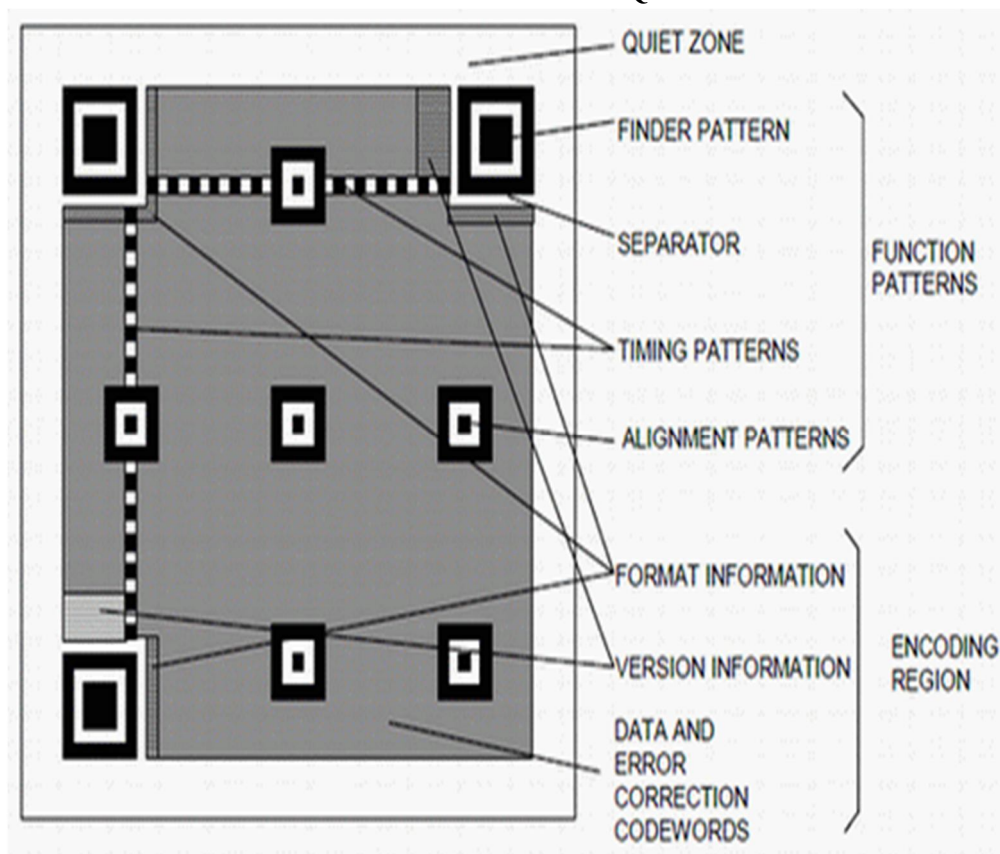
Fig(a).Structure of QR Code

QR code (Quick response code) is a matrix 2D code for high-speed reading developed by DENSO WAVE in 1994.
The smallest element (black or white square) of the QR code is called "a module".
QR Code is capable of encoding the following characters:

A.   Numeric data (digits 0 - 9);
B.   Alphanumeric data (digits 0 - 9; upper case letters A - Z; nine other characters: space, $ % * + - . / :);
C.   Byte data (default: ISO/IEC 8859-1; or other sets as otherwise defined);
D.   Kanji characters. Kanji characters in QR Code 2005 can be compacted into 13 bits.

VI.   ARCHITECTURE
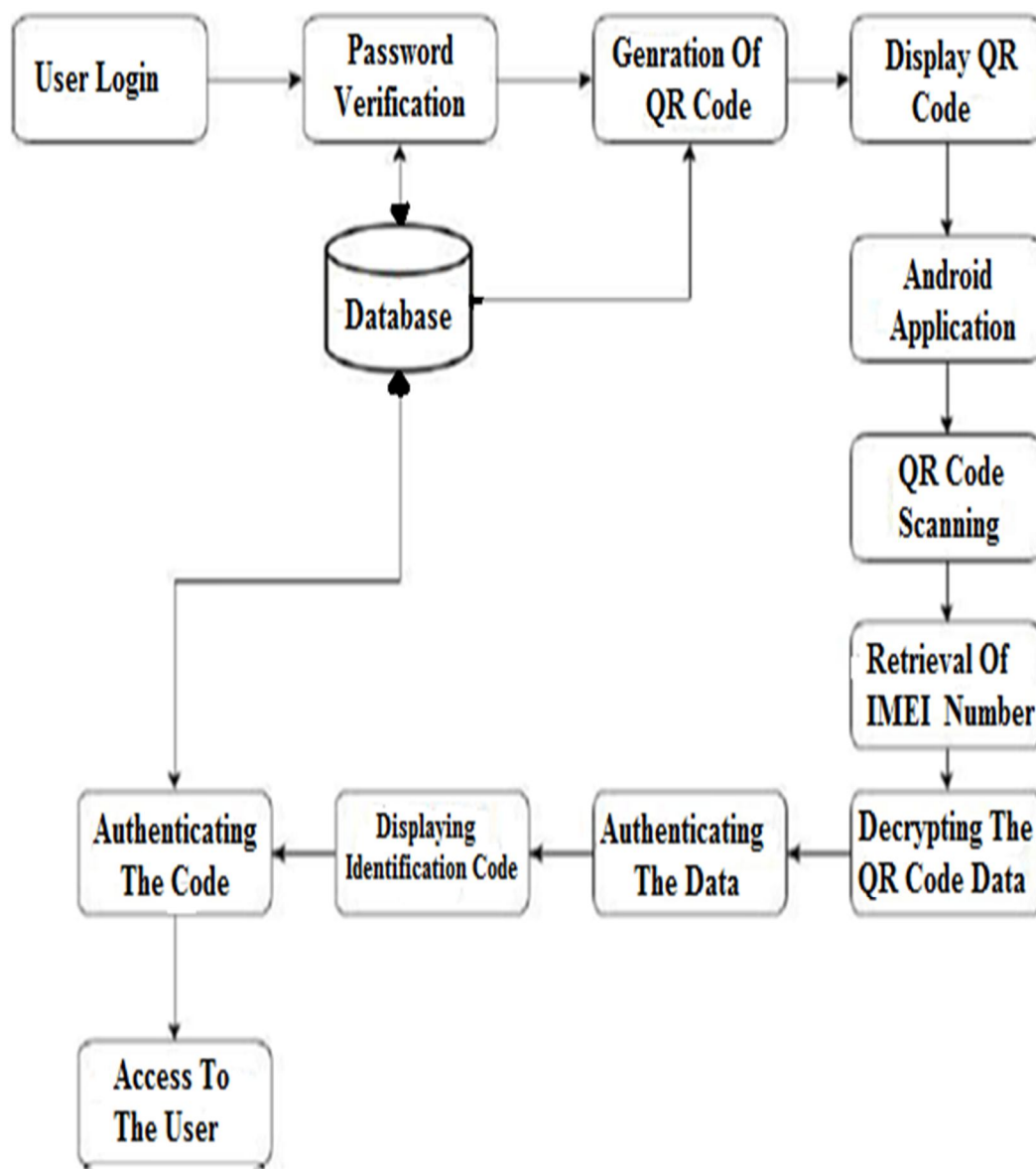
Fig(b). Architecture of the system

VII.   WORKING

A.   User Enter the login id and password.

B.   On verification of login ID and password a QR code is generated which is encrypted using AES algorithm with the help of IMEI number of user's registered smart phone and a randomly generated number.

C.   This QR code is displayed on the user's screen.

D.   User scans the QR code using his/her smart phone whose IMEI number has been registered with the bank.

E.   If the IMEI number of the user's mobile matches with the one in QR code then the pass-code is decrypted.

F.   Further it works in two modes:

G.   Online Mode: If internet connection is available on user's smartphone then decoded pass-code is directly sent to the server and user is logged in after successful authentication..

H.   Offline Mode: If user does not have an active internet connection then the pass-code is displayed on the smart phone's screen and user has to manually enter it then user is logged in after successful authentication.

VIII. FLOWCHART
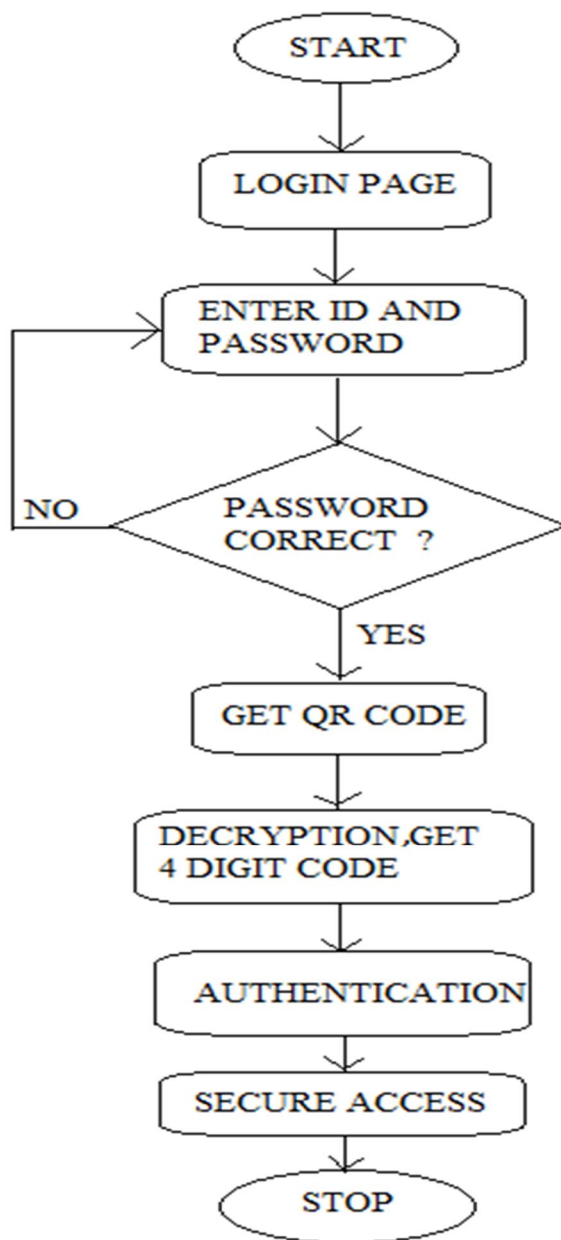
Fig(c).Flowchart

IX. ADVANTAGES

A. The QR codes are only readable by the machine so untrusted person cannot understand what is inside the QR code.

B.   QR code can store up to 4000 alphanumeric characters so we can store more complex password which is not easily breakable

C. Complete protection from key logging.

X. LIMITATION

A. The major limitation of this system is its reliability on a smart phone device.

B. IMEI number of device can be changed using some advanced techniques

XI. CONCLUSION

This work indeed provides additional security using QR code along with the traditional way of online authentication of banking which only includes user name and password.As the android application used is very light it requires very limited amount of resources. As a new pass-code is generated every time ,this method efficiently disables key logging threats. Although, smart phones are not widely used in rural areas this technique will be more useful in future when almost everyone would be having a smart phone.Also,the future scope of this work might also benefit the visually challenged people to access net banking securely.

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