

e-voting system using QR code and Mobile OTP based on Android platform for modern individuals

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Abstract:

Electronic voting (also known as e-voting) is often viewed as a tool for making the electoral process more efficient and for increasing trust in its management system. Proper implementation of e-voting solution can increase the security of the ballot, speed up the processing of result and make voting easier. Sometimes, the challenges are considerable. If not carefully planned and designed, e-voting can undermine the confidence in the whole electoral process. This paper outlines contextual factors that can influence the success of e-voting solution and highlights the importance of taking these fully into account before choosing to introduce new voting technologies.

The development in mobile devices, wireless, android technologies and data communication results in new

application that will make voting process easier and efficient. e-voting system can cast and count votes with higher convenience and efficiency which even reduces mistake rate of ballot examination. In this paper, Network, Short Message System (SMS) and e-mail provides 3 factor authentications to voters.

Keywords: e-mail, e-voting, One Time Password (OTP), Quick Response (QR) Code, Session Password, Short Message System (SMS), Visual-Cryptography.

Introduction:

E-voting greatly reduces direct human control and influence in voting process. This provides an opportunity for solving some old electoral problems but also introducing whole range of new concern. The e-voting system provides a

voting service that allows people to vote from any poll site in the country electronically. This system includes legal, regulatory, sociological and behavioral aspects of the current voting system, while adding additional convenience and more secure to the growing environment of voting process. Technology upgrades in election are always challenging projects that require careful, deliberation and planning. Introducing e-voting is probably most difficult upgrade as this technology touches the core of the entire electoral process -the casting and counting of votes.

This paper design and implement an e-voting system using QR codes and Mobile OTP for authentication of user with the maximum security. This can not only make sure voter's identity but also ensure the registration of the verifying candidate who is eligible for voting. The One Time Password (OTP) is generated and provided to voter via SIM card authentication. The Quick Response (QR) code is generated from Session password. The Visual Cryptography (VC) is performed on QR code. The Digital Signature is used for validation of OTP and Session

password. Thus, voters are provided with utmost security.

The platform of this system is Android, today's most popular operating system and well known to users. Android is a mobile operating system (OS) based on Monolithic (Modified Linux kernel) and currently developed by Google. It is available in Multi-lingual (46 languages). It uses 32 Bit and 64 Bit ARM, MIPS, x86, x86-64 as its platform.

This voting system comprises of the following components for the welfare of e-voting system. These are

1. One Time Password(OTP)
2. Quick Response(QR) code
3. Session Password
4. Visual Cryptography
5. Digital Signature

1. One Time Password (OTP):

OTP (One Time Password) is a password that is valid for only one login session or transaction. OTP avoids number of shortcomings that are associated with traditional password. Once the user has signed in for casting his vote, the request will be send to server. As soon as server

receives the request, it will generate the password and will send it to voter's device by using SIM card authentication.

2. Quick Response (QR) code:



Fig (2.1) QR Code

QR code (abbreviated from Quick Response Code) is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte / binary, and kanji) to efficiently store data extensions may also be used. The QR Code system has become popular outside the automotive industry due to its fast readability and greater storage capacity

compared to standard UPC barcode. Applications include product tracking, item identification, time tracking, document management, general marketing, and much more.

For the security purpose, we will generate the shares of this QR code. Out of these two shares, one share will send by the network and another will be send by user's e-mail ID. To view the encrypted data we perform de-cryptography, then the password for login is obtain by scanning this QR code using smart phone. To avoid hackers to find both the shares and session password proper use of QR technique is provided so that there will be secure environment for voter to cast his vote.

3. Session Password:

Session password can be generated once and used only once. This is the specialty of the session password. By using this session password, voter will login in for only one session until some error has been occurred. QR code of this session password will be made which the voter will scan and cast vote.

4. Visual Cryptography (VC):

The term Visual Cryptography was introduced by Naor and Shamir at EUROCRYPT in 1994. It is also known as 'Visual Sharing Scheme'. It is used to encrypt written material (printed text, handwritten notes, pictures etc.) in perfectly secure way. It is a special encryption technique to hide information in images. This information can be decrypted by the human vision if the correct key image is used. It uses two transparent images (shares). One image contains the secret information and the other contains random pixels. It is not possible to retrieve the secret information from one of the images. Both the images (shares) are required to reveal the information. Following steps are involved in the Visual Cryptography technique:

- Plaintext (in the form of image)
- Encryption (Creating Shares)
- Channel (Fax, e-mail)
- Decryption (Human Visual System)

Example:

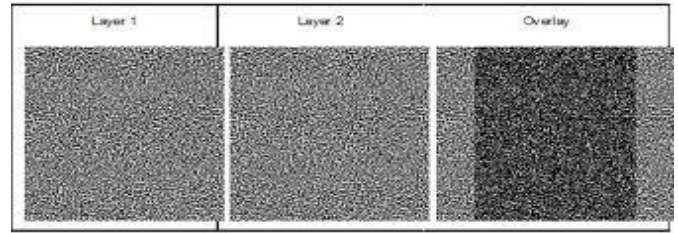


Fig (4.1) Visual Cryptography technique

When two same-sized images of apparently random black-and-white pixels are superimposed, it demonstrates visual cryptography.

5. Digital Signature:

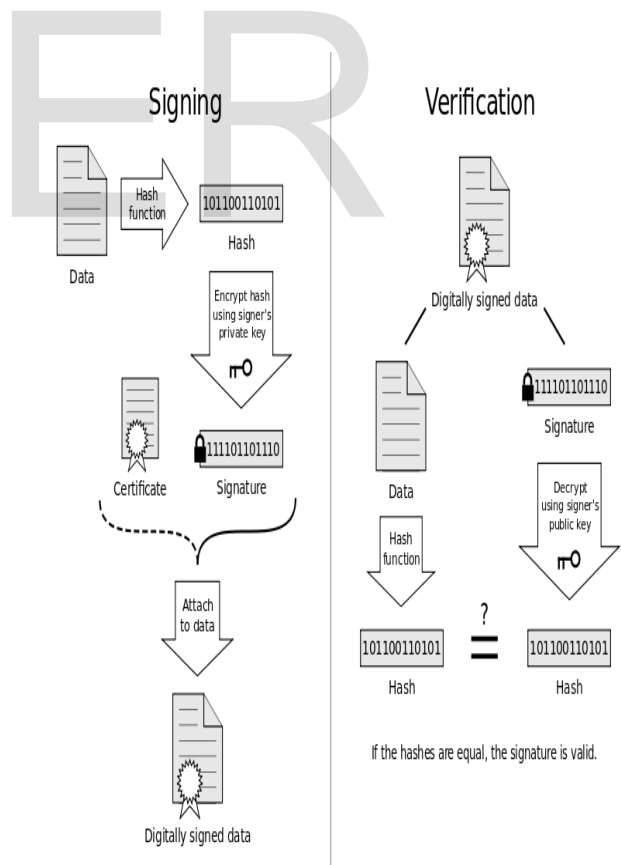


Fig (5.1) Digital Signature

A digital signature is a mathematical scheme for demonstrating the authenticity of a digital message or document. A valid digital signature gives a recipient reason to believe that the message was created by a known sender, such that the sender cannot deny having sent the message (authentication and non-repudiation) and that the message was not altered in transit (integrity). Digital signatures are commonly used for software distribution, financial transactions, and in other cases where it is important to detect forgery or tampering.

Digital signatures are often used to implement electronic Signatures, a broader term that refers to any electronic data that carries the intent of a signature, but not all electronic signatures use digital signatures. Now-a-days, users are provided with security for every purpose. In similar terms, our voting system is very much secured by using this digital signature technique.

Conclusion:

Now a days, use of e-Voting application are increased. Security is an important issue for handling such services. Current system provide security card based facility to authenticate user but this is not much more secure and will not be available for any time or situation. To overcome such type of issues we propose online e-Voting authentication system using QR-code and OTP.

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