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Smart Ration Card System Using QR Code and One Time Password

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Abstract: *In this paper, we have proposed a Smart Ration Card System using Quick Response Code (QR Code), One Time Password and SMS. The existing conventional Ration Card System consists of three categories of cards based on the user's income and the information is updated manually which leads to unfair practices. In this system, the QR Code contains the URL and an Identification Number of the customer which points to the record in the database. The QR Code can be scanned using a Smart phone. On scanning the QR Code, the user's personal details like name, phone number, address along with family member details, is displayed on the computer. Further, the desired grocery items are selected and the quantity is mentioned after entering the correct OTP. This quantity, if permissible, is deducted from the total remaining quantity. The bill is displayed and a Short Message Service (SMS) will be sent to the customer. This Smart Ration Card System will ensure transparency in the system and hence prevent the exploitation of masses.*

Keywords: *Smart Ration Card; Quick Response Code; Smart phone; One Time Password; Short Message Service.*

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I. Introduction

Ration Cards are issued by the Indian Government. Ration Cards enable user to buy fuel, food, etc. at subsidized rates. Ration Cards are an important document which can also be used as an identity proof. These groceries are distributed to the eligible customers at Fair Price Shops (FPS).

The existing system has many loopholes. It consists of a ration book for three categories. The book is updated manually according to the purchase and has to be renewed every year. This manual process is tedious and fraudulent. The customers buy extra goods on the names of dead or ineligible people. The retailers practice forgery by not selling the required quantity of goods and so customers do not get the deserved quantity of grocery. Many efforts are being taken to improve this system. Considering all the limitations of the existing systems, we have proposed a Smart Ration Card System with Two Factor Authentication using Quick Response Code, One Time Password and SMS Gateway.

The customer has to scan his QR Code which is generated after registration and is store in the database using a QR Scanner in his Smart Phone. On scanning, the customer's personal details such as name, address, number and names of family members, quantity bought and quantity remaining, etc. will be displayed. For purchase, the customer will further have to enter an OTP sent this registered mobile number using Short Message Service Gateway. This ensures the identity of the customer. Based on the income and number of family members, the total permissible quantity for each grocery item consumed by a family is decided by the Government. In this System, the databases will be automatically updated according to the purchase done by the customer and the supplies sent by the Government to the local Fair Price Shops. To maintain the transparency, a SMS containing the purchase details will be sent to the customer's registered mobile number. The customer will also be able to view the quantities supplied by the Government to the shops. In case of theft, damage or any irregularities, the customer can view and update details by entering the user name and password. This will generate and store a new QR Code which can be downloaded.

II. Related Works

Vikram Singh et al. [1] suggests a system that uses barcodes. It consists of two databases, one for storing user's personal information and the other for storing the purchase details. If the details in the barcode match with the details in the database, the user is validated and purchase is allowed. Every item in the FPS contains a specific code. The quantity of item purchased is calculated using that code. Limitations of this system are that Damaged codes cannot be scanned and they Need special equipment for scanning.

K. Bala Karthik [2] RFID is used in this system. The RFID is read and the ID is sent to the server which retrieves the registered phone number of customer. A random password is sent to this phone number for authentication. However, RFID tags should not be damaged or removed, they can be used to track movement, collision of more than one tag occurs if they are in the same range and RFID Works on Radio Frequency hence disturbance in environment causes errors.

A. N. Madur and Sham Nayse [3] Password and RFID is used in this system. Balance is checked and the system opens the valve if the balance is sufficient. The valve acts as an outlet for the grains and places them on a weight sensor. When entered amount equals the measured quantity, the valve will be closed and the database is updated. Disadvantages of RFID are sam as in those of [2].

S. Kangasubaraja et al. [4] This Smart Ration Card consists of the photo of the family head, a thumb impression and family member details. The thumb impression is also stored in the database. The thumb impression is used for authenticating the customer. Also, The Government and local database is updated according to the information of goods supply. Disadvantages of this system are that for a new member to be added, the user has to go to the Government office, finger prints of aged people cannot be detected, the head of family has to be present during every purchase for authentication, the prints cannot be changed once comitted and the system is expensive.

Sana A. Qader Perampalli and Sana Q., Dr. R. Dube [5] This Smart Ration Card System uses a Smart Ration Card and Finger print authentication. The user has to swipe the Ration Card. UID is checked with the UID in the database to check whether the card is valid. If card is the valid, the finger print authentication is done to check if the user is valid. If valid, the purchase is allowed and the required amount of grocery is allotted to the customer. Disadvantages would be similar to those of system in [4].

[6]. http://www.linkaadharcard.com/link-aadhaar-card-with-ration-card/

Here, the user needs to enter the benefit type, address details, Aadhaar Card number and correct contact number to receive the OTP. A government officer will verify this information after the request is submitted. The drawbacks of the Aadhaar Cards are that data of the cards is handled by foreign Companies, Centralized Privacy is breached and Aadhar cards cannot be made mandatory according to the Right to Privacy passed on 27 August 2017.

[7]. Mahafood.gov.in

Sr. No.	Ration Card Colour	Annual Income	CRITERIA (Some)
1	Yellow	Up to Rs. 15,000/-	No family member should be a doctor/ lawyer/architect/CA/professional tax payer. No residential phone. No four wheeler
2	Saffron	More than 15,000/- and less than 1 lakh.	No four wheeler. (excluding taxi driver). The family in all should not possess four hectare or more irrigated land.
3	White	Rs. 1 Lakh and above.	Any member of the family possessing a four wheeler or the family in all holding more than 4 hectare irrigated land.

TABLE 1 Categories of Ration Cards

III. Proposed System

This proposed Smart Ration Card System uses Quick Response Code, OTP and SMS Gateway. The user has to register to be able to use the Smart Ration Card through the UI. On Registration, the user will be provided a QR Code, Username and Password. This information along with the personal details will be stored in the database. The users will be allotted a category (white, saffron or yellow) based on the user's total income and possessions.

QR Code contains the destination URL and the unique ID of the customer. On scanning the QR Code, the personal details of the customer will be displayed on the screen. For purchasing, the user has to select "Purchase" Option. On selecting "Purchase", an OTP will be generated and sent to customer's registered mobile number for authentication of user. The user has to enter this OTP to be able to purchase goods. After selecting the required grocery items and their quantity, the balance will be checked. If the balance is sufficient, the purchase is allowed and the databases are updated automatically. The purchase details are fetched from the database and an SMS containing this information is sent to the customer's phone number for transparency.

The users will also be able to view the quantity of goods sent by the government to the local shops. This information will be stored in the database. The quantities in the local shops will be automatically updated after each purchase.

Technologies used to build a website for this system will be PHP, MySQL for the backend and JavaScript, HTML and CSS for the frontend.

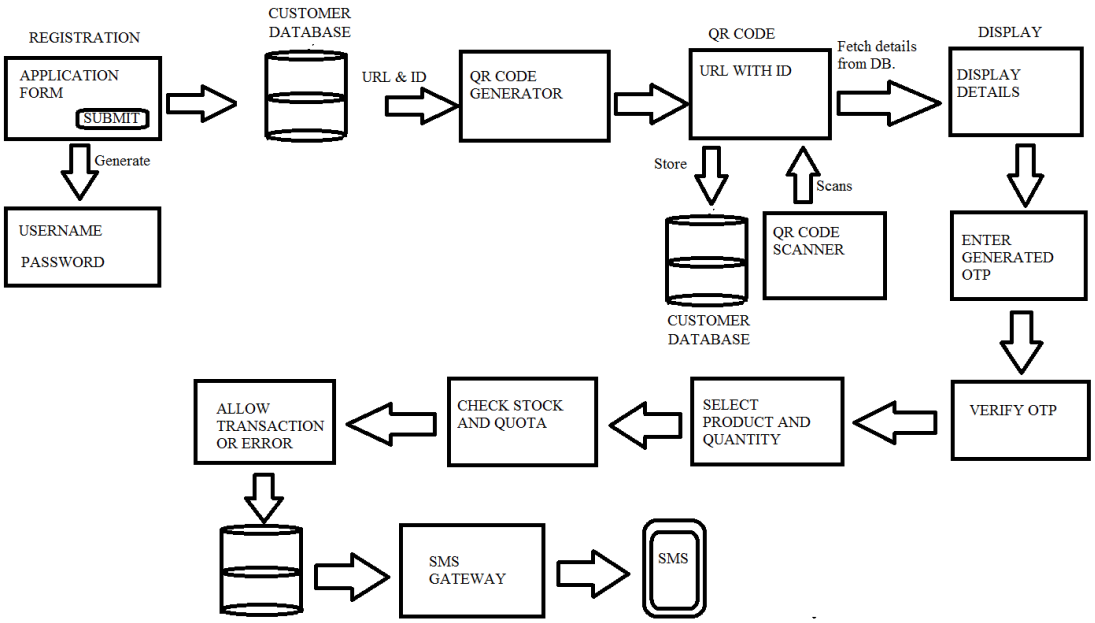

Fig. 1 Proposed System Architecture

IV. Algorithms

4.1. To generate passwords of length 6 for users:

After successful registration of the user, the user will be provided a password that will be stored in the database and also sent to the user. This password will be used for updating the user's information.

Step 1: Start
Step 2: Define strings to use for character combination in the password (a-z, A-Z, 0-9).
Step 3: Define length of the passwords.
Step 4: Generate a random number that will be used to randomly select characters from the strings defined above.
Step 5: Repeat step 3 to generate random integers for each of the 6 characters in the password produced.
Step 6: Extract 6 characters randomly from the defined strings.
Step 7: Combine the characters.
Step 8: Display the password and send it to the user over e-mail.
Step 9: Stop.

4.2. To generate a downloadable Quick Response Code:

After successful generation, along with the password, unique Quick Response Code will also be generated. The user will have to scan this QR Code to view his personal details which acts as an identity proof of the user. This QR Code will be sent to the user's registered e-mail address from where he/she can download it.

Step 1: Start
Step 2: Download PHP QR Code library.
Step 3: Create a text file containing the text to be included.
Step 4: QRcode::png ("http://www.textfile.com", "test-me.png", "L", 4, 4, true);
Step 5: Stop.

4.3. To update government and shopkeeper databases after dispatching the stock:

This proposed system also keeps a check on the quantity of groceries sent by the Government, the quantity received by the Talukas and the quantities sent to each registered shop. These quantities will be automatically reduced after each purchase.

Step 1: Start
Step 2: Enter the total quantity supplied by the Government to each Taluka.

Step 3: Save the quantities for each Taluka respectively.
Step 4: Store the Quantity of stock every Shop must receive.
Step 5: Deduct the quantity from the shop database after every purchase.
Step 6: Stop.

4.4. To allot Ration Card Category:

Like the conventional ration card system, categories will be allotted to every user based on his family's total annual income. For income less than Rs. 15000, "Yellow" card category will be allotted. Similarly, for income greater than Rs. 15000 and less than Rs. 1 Lakh, "Orange" card and for income greater than 1 lakh , "Saffron" cards will be allotted.

Let i= annual income,
c=0 ; if customer does not own vehicle
c=1; if customer owns vehicle
p=profession
l=irrigated land
If(i<=15000 && p=="NO" && c==0)
then category= yellow card (1)
If(i>=15000 && i<= 1 lakh && c==0 && l< 4 Hectares)
then category= saffron card (2)
If(i>=1 lakh || c==1 || l> 4 Hectares)
then category= white card (3)

4.5. To update quantities in database:
After every purchase, the quantities remaining at every shop will be automatically updated.
R= remaining quantity of product in shop
r= Remaining Quota of Customer
P= quantity demanded by customer
If (P<=r) {
Provide ration;
r=r-P (4)
R=R-P } (5)

V. Expected Result

The expected result of this System is that the system should correctly be able to store information the database. It should be able to generate QR Code successfully and should be able to retrieve data accurately on scanning the Code. The quota, card category, etc. should be correctly allotted. An OTP should successfully be generated and sent to the customer. The balance should be correctly checked after selecting grocery items. An error should be displayed if the limit is exceeded. The user should be able to receive a SMS containing their purchase details. The quantity sent by the government should also be updated.

VI. Advantages

6.1. Security:
The proposed system uses Usernames, Passwords and One Time Passwords for the security of the users. The information cannot be updated by any unauthorized person unless the password is shared. The correct combination of username and password is required to update a user's information. If the user wishes to proceed for buying grocery, an OTP will automatically be generated to ensure the authenticity of the user.

6.2. Reduce Corruption.
Due to transparency in the flow of supplies from the Government to the shops, automatic updating of databases and displayed quota and remaining permissible quantity, the chances of corruption can be reduced.
Secure authentication provided.

6.3. Elimination of manual work.
Manual work will be eliminated as all the data will be stored in the databases, databases will be updated automatically as and when necessary..

6.4. SMS confirmation

A SMS will be sent automatically to each customer before purchase for OTP verification and also a bill will be sent after purchase.

VII. Conclusion

This paper contains the study of existing Ration Card Systems and their disadvantages. It contains a solution to these drawbacks. It also explains the detailed working and design of the proposed system which uses Quick Response Code and OTP. Some of the algorithms used in the proposed system are listed and explained. The major limitation of this proposed Smart Ration Card System is that it requires internet.

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