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E-Ration Distribution System Based on QR-Code

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Abstract: ***Ration cards are essential for many households as they provide access to necessities such as food and fuel. However, the existing ration distribution system has one main drawback: fraudulence, where distributors sell materials to unauthorized customers. In this paper, we propose an E-Ration distribution system based on QR-code to address these issues.***
The proposed system uses QR-codes on ration cards, which when scanned provide details about the customer and distributor as well as the available ration.
To implement the system, we develop an application that tracks the distribution of ration and logs its status. The application also allows for easy monitoring of stock levels and distribution records, which can be accessed by authorized personnel. This minimizes the human intervention as much as possible to make the system efficient and cost-effective.
Keywords: E-Ration, QR-Code, Ration Distribution System, Fraudulence, Monitoring, Stock Availability, Public Distribution System, Application.

I. INTRODUCTION

The Public Distribution System (PDS) in India is plagued with challenges such as fraud, illegal product smuggling, and limitations in distribution. To address these issues, an E-Ration distribution system based on QR-code is proposed to replace the manual labour involved in the PDS.
The proposed system uses QR-codes printed on ration cards to provide details about the customer, distributor, and available ration. The use of QR-codes eliminates the need for manual labour, reducing the chances of human error and fraud. By automating the process, the system increases transparency and ensures that ration supplies reach only authorized customers.
The motivation behind this research is to develop an efficient and cost-effective system that ensures fair distribution of ration supplies to poverty line people. The proposed system not only reduces the cost involved in the PDS but also enables the government to monitor the distribution and stock availability with each distributor.
The contribution of this research is the introduction of an E-Ration distribution system based on QR-code that helps to minimize fraudulence, increase transparency, reduce human errors, and ensure that ration supplies reach only authorized customers. The proposed system is a step towards a more efficient, effective, and transparent PDS, which can ensure food security to the needy people and eliminate illegal activities such as product smuggling.

II. LITERATURE SURVEY

Several studies have been conducted to improve the Public Distribution System (PDS) in India. The Smart Ration Delivery system proposed in [3] allows users to select the nearest ration shop and choose between home delivery and physical delivery options. This QR code-based system reduces the need for manual processes in the PDS, thereby increasing efficiency and transparency.
In [7], the authors propose an E-Ration system that uses a personal data assistant (PDA) device with RFID tag as an e-ration card, similar to a swipe card. The PDA device is comparable to a ticketing machine, and the e-ration card is used to control the distribution of ration supplies.
Another proposed system, the Centralized Web Enabled Ration Distribution and Corruption Controlling System, was presented in [2]. This system aims to provide a smooth and easy ration distribution process, while also controlling corruption in the system.
The proposed system based on QR-code builds on these prior works and contributes to the automation of the PDS. The use of QR-code on ration cards allows for better tracking of distribution and stock availability, and reduces potential for fraud.

III. METHODOLGY

A. Proposed System

In this proposed system, we aim to leverage E-government technology, which is increasingly being implemented in various areas of government administration. Specifically, we will use QR code technology to create a unique module for each customer. This will help to streamline the distribution process and minimize fraudulence.

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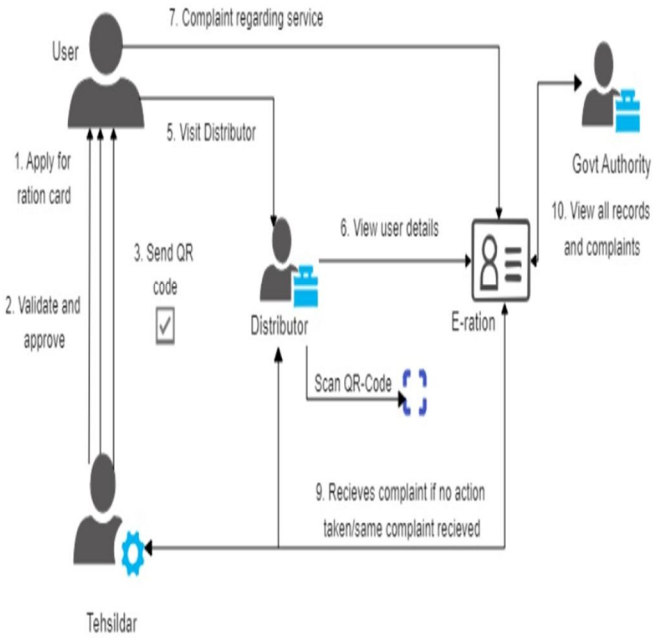
Additionally, we plan to develop a complaint portal where customers can easily register complaints against any distributor for any grievances. This will improve transparency and accountability in the distribution process, leading to better customer satisfaction.

B. System Overview

The application is a web-based system which has been implemented using Java Servlet and JSP functionalities. The following are the main features of the design:

1) Cross platform support: It offers support for most well-known and commercial operating systems.
2) Encryption and decryption: Data is encrypted in Java using AES algorithm and decrypted in android app which makes it.
3) QR-Code generation: Information will be encrypted behind QR-Code. It will be used and will be sent to user. Scanned by distributor to show the quota.
4) Complaint: System also gives option for registering complaint in case of fraud.

C. Architecture



The above figure describes the architecture of proposed system. The system follows a step-by-step approach, which ensures that every user is validated and authorized to receive the ration.

The first step of the process is for the user to apply for a ration card by submitting the necessary documents.

These documents will then be verified by the tehsildar of the particular area. After verification, the tehsildar decides whether to approve or reject the application.

If the application is approved, the tehsildar then proceeds to allot the ration card to the user. The ration card is then issued with a unique QR-code, which is sent to the user. This code serves as a means of verification during the ration distribution process.

Next, the user visits the distributor to receive the ration. The distributor scans the QR-code, which displays all the details of the user's ration card, including the type and quantity of ration they are entitled to receive. This process ensures that only authorized users receive the ration. If the user faces any fraud or mismanagement, they can register a complaint. The tehsildar is responsible for verifying and investigating the complaint and taking necessary action. Finally, the government authority/official has access to all the complaints and can take appropriate action.

IV. SYSTEM REQUIREMENTS SPECIFICATION (SRS)

A. *Functional Requirements*

The QR-code based e-ration distribution system should have the following functional requirements:

1) Everyone should be able to see the portal's landing page easily and comfortably. Request must be properly sent to tehsil office without fail.
2) Dashboard must be updated after every new entry or any other CRUD operation. Fetching the data from DB and showing it in an effective manner.
3) Encryption of data should be done preperly using AES algorithm.
4) Generated QR code should be sent back as a response to customer's request.
5) Once a user raises a complaint it must go to Distributor first and then to Govt Authority if distributor fails to respond.

B. *Non-Functional Requirements*

The QR-code based e-ration distribution system should have the following non-functional requirements:

C. *Performance*

All the laptops and mobiles must be with the latest configuration.

1) Moderate speed internet is must for the mobiles and the laptops.

D. *Safety Requirements*

1) No outsider/customer should be able to access any of the distributor's details.
2) Customer cannot share the QR code with anyone.
3) It should not be vulnerable to attack.

E. *Software Quality Attributes*

1) *Scalability:* The system is initially designed for n number of users.
2) *Availability:* Govt. official will be available for only in official hours and the customers platform will be available 24/7.
3) *User-Friendly:* The interface should be user-friendly.
4) *Security:* Users are authenticated using OTP based authentication.
5) *Maintainability:* After the deployment of the project. However, also it can be fluently maintained by the software inventor, if any error occurs.
6) *Correctness:* The newly introduced features should function correctly. No data should be lost.

V. RESULT AND DISCUSSION

The proposed E-Ration distribution system based on QR-code aims to automate the tasks at the ration shops, eliminate manual intervention, and minimize fraudulence. The use of QR-code has made it possible to uniquely build a module for each customer, thereby ensuring the authenticity and accuracy of the data. The complaint portal has also been developed, which allows users to register their complaints against the distributors, making the system more transparent and accountable.

The proposed E-Ration distribution system based on QR-code is expected to provide several benefits, including:

1) *Improved efficiency:* The proposed system's automation and real-time monitoring capabilities are expected to improve the efficiency of the distribution process, reducing wait times and minimizing the potential for errors and fraud.
2) *Increased transparency:* The complaint portal is expected to increase transparency and accountability in the distribution process by providing a platform for users to register their complaints against distributors.
3) *Enhanced tracking capabilities:* The real-time monitoring of distribution and stock availability is expected to enhance the tracking capabilities of the system, improving the overall service quality.
4) *Reduction in fraudulence:* The unique module for each customer built using QR-code is expected to minimize the potential for fraudulence, ensuring the authenticity and accuracy of the data.

To summarize, the proposed system has shown immense potential to revolutionize the public distribution systems and make them more efficient, transparent, and accountable. The successful implementation of the system can help in fulfilling the demand of needy people and ensuring that they receive quality goods and services without any fraudulence or corruption. Further research and development can be carried out to enhance the system's functionalities and make it more user-friendly and accessible to all.

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VI. CONCLUSION

In this work, we have presented a novel approach to improve the existing manual-based public distribution systems used for distributing essential commodities to individuals in economically weaker sections. We proposed a QR-code based E-Ration distribution system that reduces the potential for fraudulent activities by enabling tracking and monitoring of stock availability and distribution. Our proposed system utilizes modern E-government technologies and minimizes the reliance on human intervention to ensure accurate and timely delivery of essential commodities to those who need them most.

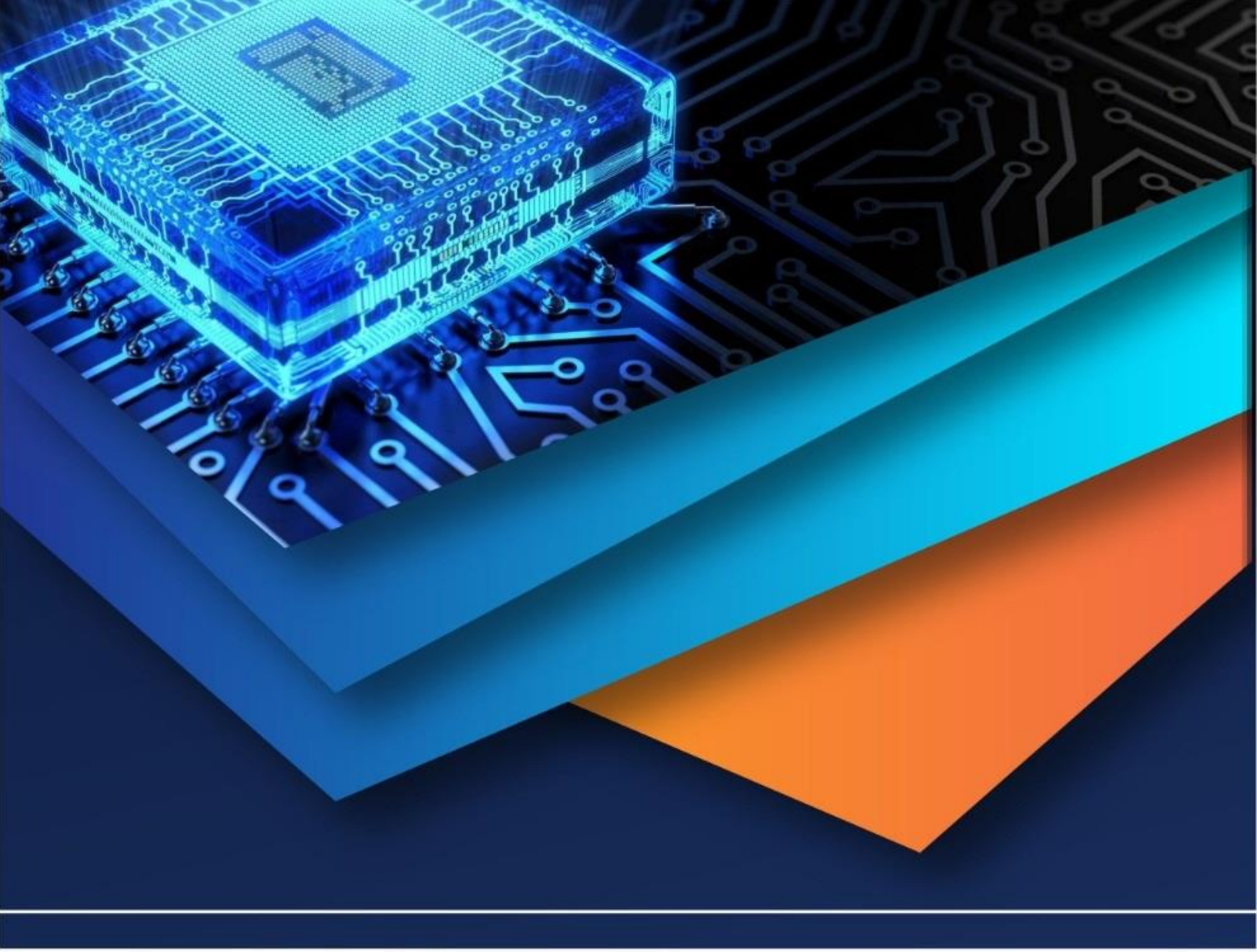
Through our evaluation of the proposed system, we have demonstrated that it has the potential to effectively address the challenges faced by the existing manual-based public distribution systems.

We believe that our proposed system has significant potential for future implementation and can be used to improve the lives of individuals in economically weaker sections of society by ensuring the timely and accurate distribution of essential commodities. Further research could focus on extending the system to include additional features such as integration with biometric authentication technologies for increased security and accuracy.

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