E-Ration System

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ABSTARCT

The resources in the world are finite and though the desire for resources is infinite. One of the largest retail systems in the world is India's public distribution system. The manual work involved and lack of automation, makes this system inefficient. The conventional ration card system is replaced by automatic rationing system. This system uses authenticated finger print detector to provide products to the users. When the input is provided, the products are obtained from automatized ration shop. This system provides products with accurate weight and unnecessary selling of goods can be avoided. The ration shop is connected to government via GSM to prevent irregularities in ration distribution

Key Words- *PDS, FPS, GSM, AVR*

INTRODUCTION

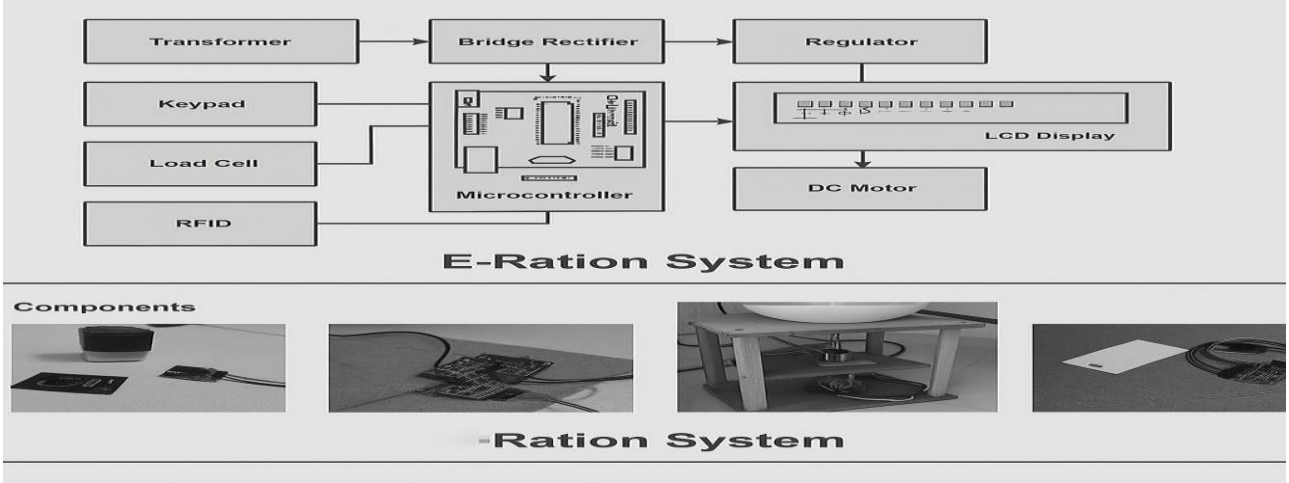
One of the largest retail systems in the world's is India's public distribution system with four lakhs fair price shops. These shops provide sugar, rice, wheat, kerosene etc. to the customers at affordable rates. This network of shops is spread all over the country which is controlled and monitored by central government along with state government Quantities of these products are fixed for each family depending on their monthly income. There are many families who do not claim their quota of food grains every month. The shop dealers may have fake ration cards which inhibits the customers from getting the exact amount of ration they need. The dealer may sell the goods at higher rates to outer markets there by earning a good profit. This makes the current public distribution system corrupted and inefficient. The current scenario has led to anarchy and black marketing.[1]

PURPOSE

The purpose of the E-Ration System is to develop an automated, technology-driven solution that addresses the limitations of the traditional Public Distribution System (PDS). This system is designed to enhance the transparency, efficiency, and accountability of ration distribution by incorporating electronic authentication methods, automated dispensing units, and real-time data processing. The proposed system aims to reduce human dependency, eliminate fraudulent activities such as duplicate or unauthorized ration claims, and ensure that subsidized food and resources are delivered accurately to the intended beneficiaries. By utilizing electrical and embedded system technologies, the E-Ration System facilitates a secure, scalable, and reliable framework for modernizing government welfare distribution mechanisms.[2]

MODELING AND ANALYSIS

This section includes a brief overview of all the components used in the system. Figure describes the system in the form of block diagram.



Hardware Components:

- Microcontroller (e.g., Arduino, ATmega328, or PIC)

Central control unit to manage input/output operations.

- Load Cell with HX711 (Weight Sensor)

Used to measure the quantity of ration being dispensed.

- RFID Module or Biometric Sensor

For user identification and authentication.

- LCD Display (16x2 or 20x4)

To show user information, status, and ration details.

- Keypad (4x4 Matrix)

Optional input method for user PIN or selection.

- DC Motor / Servo Motor

To control the opening/closing of the ration dispenser.

- Relay Module

For switching higher-power devices like motors.

- Power Supply (Transformer, Bridge Rectifier, Voltage Regulator)

To provide required DC voltage to all components.

- GSM Module (SIM800L) [optional]

For sending SMS updates or alerts.

- EEPROM

To store user data, ration logs, etc.

- Buzzer / LED

For alerts or status indication.

Software Tools:

- Arduino IDE / MPLAB / Keil uVision

Depends on the microcontroller being used (Arduino, PIC, or 8051).
Used to write, compile, and upload code.

- Embedded C / C++

Programming language used for microcontroller coding.

- Proteus / Multisim / Tinker cad [3]

Simulation software for circuit testing before hardware implementation.

- Fritzing

To design the breadboard or PCB layout diagrams.

- Cool Term / PuTTY (for Serial Communication Debugging)

Helpful in debugging sensor readings or serial output.

EXISTING SYSTEM

The current ration distribution system is manual and operates through Public Distribution Shops (PDS). Ration cardholders collect their allotted food grains by presenting their physical ration cards. The dealer verifies the

card, weighs the grains manually, and records the transaction in a register. This outdated system lacks automation, transparency, and accuracy, which your E-Ration system aims to solve using microcontrollers, sensors, and RFID technology.[4]

LITERATURE SURVEY

1. Smart Ration Card System Using RFID & GSM Technology

Author: G. Rajesh et al., International Journal of Engineering Trends and Technology (IJETT), 2014
Proposed an RFID-based identification system for ration cardholders.
Integrated GSM modules to notify users about ration availability and transactions.
Resulted in improved accuracy and automation, but still lacked real-time government monitoring.

2 . Automated Ration Distribution Using Load Cell and Embedded System
Author: M. Praveen Kumar et al., International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), 2016
Introduced load cell integration with a microcontroller for accurate grain dispensing.
Achieved better quantity control and minimized manual errors.
Lacked biometric or RFID-based authentication, which could improve security.

3. IoT-Based Smart Rationing System
Author: Dr. S. Meenakshi, International Journal of Recent Technology and Engineering (IJRTE), 2019
Focused on using IoT and cloud connectivity to track ration usage in real-time.
Enabled remote access to beneficiary data and stock levels by government officials.
Highlighted the potential for centralized monitoring but required better data privacy handling.

PROPOSED SYSTEM

The proposed E-Ration Distribution System is an automated, smart solution designed to address the limitations of the traditional public distribution system. It employs embedded technology and smart identification to ensure accurate, transparent, and efficient distribution of rationed goods to verified beneficiaries.[5]
This system integrates a microcontroller-based control unit with modules such as RFID for user authentication, load cell sensors for accurate quantity measurement, and an LCD display to provide real-time information to the user. A motorized dispensing unit ensures the automated release of goods, eliminating human intervention and associated errors.

METHODOLOGY

Existing public conveyance framework (PDS) presents the reasonable value shop (FPS) for circulating the grains to proportion card holders. Now a days this PDS includes debasement and restricted sneaking of products. The proposed framework recommends a way to deal with automate every one of the manual positions in proportion shop and the entire thing from information section to weighing to whipping is set up by machines and individuals have no hand in that. This gives high unwavering quality and there carries a feeling of straightforwardness to the buyers. Framework Architecture The proposed framework comprises of two units. Server and Client unit. The worker will totally control the exercises like client recognizable proof, cautioning the clients just as retailer at the appearance of grains and refreshing the information base. [6] The admin has by and large admittance to Server unit by signing into the framework. Administrator can perform different undertaking which are heavily influenced by him. The subsequent unit is customer unit which is put at the apportion shop.

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CONCLUSION

The proposed E-Ration Distribution System presents a significant step forward in modernizing and automating the public distribution process. By integrating RFID-based user authentication, load cell-based quantity measurement, and microcontroller-based control logic, the system ensures accurate, efficient, and transparent delivery of rationed commodities. This project addresses critical issues in the existing manual system such as fraud, human error, and lack of accountability. The inclusion of features like automated dispensing, real-time user validation, and optional GSM alerts further enhances the security and accessibility of the system. Moreover, the proposed solution is scalable and cost-effective, making it suitable for deployment in both rural and urban areas.

With further integration of IoT and cloud-based analytics, the system can offer real-time monitoring and centralized control by government authorities, thereby promoting transparency and trust among beneficiaries. In conclusion, the E-Ration System offers a reliable, smart, and sustainable solution for fair distribution of essential commodities, and has the potential to revolutionize the public distribution infrastructure.

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