

# IoT Based Smart Public Distribution System

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## ABSTRACT

The system of providing basic domestic commodities on subsidy to poor families in developing countries like India is an important aspect to meet fundamental requirement of people. Many problems are encountered by the existing system such as, Ration distribution to unauthenticated card holders. Card holders wasting time in queues for collecting ration for hours. Lots of malpractices such as hoarding, black marketing and overcharging. The project titled IOT based smart public distribution system proposes an automatic method of distribution of commodities to authenticated card holders. The users need to access to their account through the Smart phone by entering their ID and password. Once they are successfully logged in, they can view the stock availability. This system uses Raspberry-pi as controller and it is implemented with Minutiae extraction based fingerprint matching algorithm which efficiently works with greater accuracy score. Once user is logged in, he/she can view commodities that is available for that particular family account. To dispense the commodities, user is expected to provide fingerprint for next level of authentication. Once user is verified, the system dispenses a threshold quantities of commodities for the particular family

**Keywords:** Domestic Commodities, Unauthenticated, Hoarding, Minutiae Extraction, Fingerprint, Dispenses, Threshold, Commodities,

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## 1. INTRODUCTION

Government provides food, oil and fuel to economically challenged people at subsidized rates which are distributed to the public through ration shops. The stocks for these ration shops will be bought from the farmers and then sold at subsidized rates. Every month fresh stock arrives at these shops and that needs to be distributed to public. The owner of most of the ration shops resort to malpractices and the allotted amount of ration is not distributed to authorized people. To counter these fraudulent activities this system is developed which incorporates Public distribution system in the country has undergone organic changes from the rationing system introduced during World War II to an important social safety program to ensure

food security of the country. Under the public distribution System (PDS), the central government procures and supplies special essential commodities to fair price at fixed central issue prices. In the past, a number of items like iodized salt, palm oil, candles, ghee, cloth etc. have been distributed through the PDS, however at present department of food and supplies have confined the fair price distribution to few cereals, wheat, rice, sugar and kerosene oil. At present India has 4,78,000 ration stores operating across many localities, villages, towns and cities in the country making it the largest distribution network in the world. Department of food and supplies is providing ration cards to the citizens based on their economic conditions.

There are mainly two types of cards: the following features. Fingerprint authentication system used to identify a particular user making the system secure. he commodity and it's quantity needs to be selected using android application. Predefined information about the amount of ration to be distributed. Automatic ration distributing mechanism. Below poverty line (BPL) cards . Above poverty line (APL) cards IOT based Smart public distribution system 2016-17 Against the essential commodities act there are many fraudulent activities going on unfair price shops. Users are forced to wait in long queues for hours together to purchase the essential commodities. Card holders and their family member's details are stored in a notebook. Hence each time transaction is made by the card holder, entry had to be made manually in the book. Maintenance of record in book is difficult. Thus, an efficient and automated system is required to minimize the misappropriations. Quantity of ration to be given for these cards is fixed based on the number of members in the card holders family. The Department of food and supplies enforces control over these provisions under the orders by the Essential Commodities Act, 1955 regulating trade in specified essential commodities by keeping a close watch on stocks, passage, quality and availability of these commodities. Enforcement consists of collection of information and evidence of contravention of provisions of the relevant control orders and action taken against them under the provisions of Essential Commodities Act.

## **2. MATERIALS AND METHODS**

### **a.) Finger print module:**

A fingerprint module is interfaced with the Raspberry- pi. A minutiae algorithm is used to process the fingerprint obtained from the module. Fin ger print processing includes two parts: fingerprint enrollment and fingerprint matching. During enrolling, user needs to enter the finger two times. The system will process the two time finger images, generate a template of the finger based on processing results and store the template.

### **b.) Raspberri pi:**

The details of each user of the family are enrolled in the database. Raspberry pi takes the serial number from reader and access corresponding record in the database in accordance with the thumbprint identification.

### **c.) Motor and Relay circuit:**

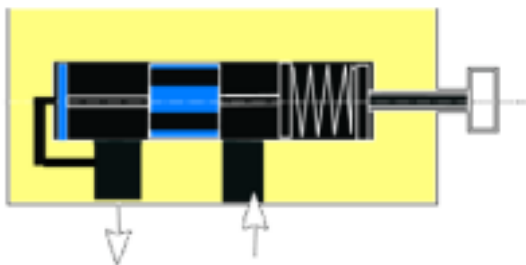
The motors are used to control the valve arrangement (i.e. to open and close the valve). These motors are controlled by relay (timer) circuit. Relay circuit is used for weight measurement as the grain falls through the funnel and when it reaches the required amount the valve will close automatically.

**d.) Hydraulic Valve:**

The purpose of flow control in a hydraulic system is to regulate speed. This valve controls the speed of an actuator by regulating the flow rate. The valve is controlled by electric current which passes through a DC motor. The motor operates the hydraulic valve to dispense the oil to the cardholders.



**Figure 2.1: Raspberry pi embedded board.**



**Figure 2.3: Cross sectional view of Hydraulic valve.**

The system software is the interface between hardware and user applications. A computer program that is designed to run a computer's hardware and application programs.

Initially the user is asked to enter the ID and password given to them in the app. The Raspberry pi compares the unique ID with the data base. If the ID matches, the user can view their profile which will have details of their transactions. Then user is asked to scan the finger. Once the user is authenticated, the commodity and quantity can be selected their itself using buttons given. If the commodity and quantity are valid, the system dispenses the valid commodity. However, if the authentication fails the system waits for valid authentication. Figure 5.1 shows the flow chart of IOT based smart public distribution system.

**e.) Android Studio**

Android Studio is the official integrated development environment (IDE) for Android platform development. It was announced on May 16, 2013 at the Google I/O conference. Android Studio is freely available under the Apache License 2.0. Google provides an IDE called Android Studio to develop android applications.

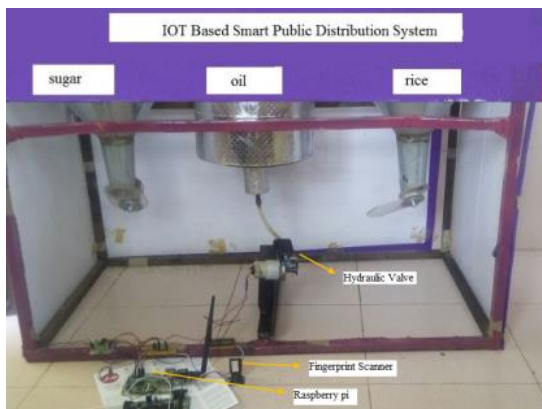
Android applications require specific configuration files. The application logic is primarily written in the Java programming. The android developing tool converts these files into an android application.

**f.) Raspbian**

Raspbian which is based on Linux Debian is used as an operating system for the proposed project which has a strong documentation. Raspbian comes pre-installed with plenty of software for education, programming and general use. It has Python, Scratch, Sonic Pi, Java, mathematical and more. The raspbian with PIXEL image contained in the ZIP archives is over 4GB in size, which means that these archives use features which are not supported by older unzip tools on some platforms.

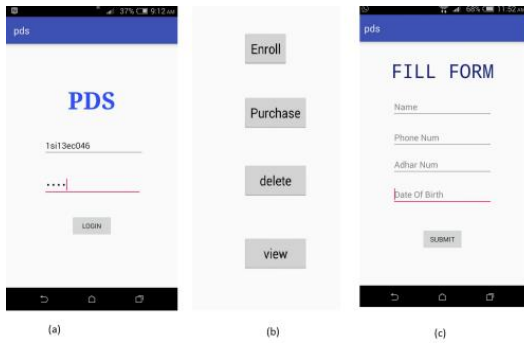
**3. RESULTS AND DISCUSSIONS**

The snapshots of the result are shown below. Finger print module is interfaced to the Raspberry pi board through serial port. The user enters unique ID and password into the android application which is then verified using stored database. It is followed by Finger print identification to verify the identity of user. After validating ID and password user is asked to scan the finger which acts as a level 2 authentication to stop any fraudulent activity in case if the ID and password are hacked. Figure 6.1 shows the dispensing containers for three commodities rice, sugar and any fluid which are connected by DC motors (for rice and sugar) and hydraulic valve arrangement (for fluid)via H-bridge.



**Figure 3.1: Snapshot showing the dispensing containers**

Displays user login page where they have to enter ID and password to see their profile. Figure 6.2 (b) shows different options to the user. They can purchase, enroll there fingerprint, delete unwanted fingerprint or view the profile. User can enrollhis/her fingerprint by pressing enroll button as shown in Figure



**Figure 3.2: Snapshot showing an overview of android app.**

#### **4. CONCLUSION AND FUTURE WORK**

IoT based Smart public distribution system is an automation system and it is a recompense over the present fair price shops. Fingerprint authentication uses Minutiae extraction based algorithm, which makes the system more secure and accurate. It eliminates fake ration card holders and protects the interest of the common people ensuring the country's food security. By means of its performance one can reduce the corruption level. Selecting the commodity and quantity through the android app will make the system more smart and robust. It will help the country's economy to reach new heights. The automated PDS is easy to implement and requires much less hard work when compared to the other system. Using this system one can avoid the malpractices because there is no manual operations and also all information is stored in a database. So this system will be really helpful to the people. Project can be further extended by making the payment to the purchased commodities can be done online. Thus it will make system more automatic. Distance of communication between server and client can be increased using internet.

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