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Design and Implementation of Smart Rationing By Face Recognition System

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Abstract: *Ration card plays a vital role for the household details such as to get gas connection, family member details; it acts as address proof etc. In this regard, we have wished for a smart measure card system using Face Recognition Technique and IOT to thwart the derelictions and corruption in the current ration distribution system. In this system conventional quota card will be replaced by a Face Recognition system. This Faces will be verified with family members for authentication of the user. If user is found to be authentic then monthly quota of the ration available for the user is displayed. After successful transaction the database will be updated stating the ration content delivered to the user. This system will require very less human efforts for operation and is also very secure. By implementing this system government can keep track of all the delivered ration content very easily.*

Key Word: *Internet of Things; Face recognitiong system; Haar algorithm; Rasbherry pi; Universal Serial Bus,* Public Distribution System.

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I. Introduction

The public distribution stores or ration stores use ration cards which are in the form of a book are used for general identification of the customer and holds the user's personal information and purchase history. On successful purchase, the details of purchase are entered in the card and in the purchase register at the employee's side. This is the system which is exists at the ration stores now. This system has a lot of drawbacks. The ration card should be renewed every year by pasting additional leaves in the same card. There is a possibility of the ration card being torn. In some ration stores, dealers involve in malpractices like diverting food grains to open market to make profits. As a result there is a possibility of consumers sent back with a no stock sign even though there are food grains in stock. Having said the limitations imposed by the conventional ration system, we propose a solution in the form of a ration card system based on Face Recognition technology. The user will be authenticated and the user details are retrieved from the user database from the web server and are updated in the window application which is open in a computer system at the employee side. When the user asks for a particular quantity and type of food grain, the details are entered in the application by the employee and are updated in the web server. Additionally the users can check their purchase history and their details in the dedicated website by entering their registered username and password.

In current ration distribution system of India there are many limitations and misuse of ration at various levels, which needs to be improved. Further most of the helping shopkeepers keep fake allotment card with them. Due en route for fake ration cards, the dealer receives the extra helping from higher government authority and he jumble sale it into the open fair at higher amount to earn some extra takings. Even and yet the system will shrink the security issues and mismanagement present popular the current public distribution system the final cost of the ordering is high. To enter the database and proof of user involves internet connectivity which can be an unruly in secluded places.

II. Literature Survey

In E-ration PDS using SMART CARD and GSM technology is an innovative approach in public distribution system (PDS) which is very useful for efficient, accurate, and automated distribution of ration distribution system. Presently ration distribution system has drawbacks like inaccurate quantity of goods, large waiting time, low processing speed and material theft in ration shop. Main objective of the designed system is to replace manual work with the atomization of ration shop to have a transparency in PDS. Proposed E- ration shop for public distribution system replaces conventional ration card by smart cards which consist of all the details about the card holder like family details, type of card and its validity etc.

Ration card plays a vital role for the household details such as to get gas connection, family member details; it acts as address proof etc. In this paper, we have proposed a smart ration card system using Radio

Frequency Identification (RFID) Technique and IOT to prevent the malpractices and corruption in the current ration distribution system. In this system conventional ration card will be replaced by a unique RFID tag. This RFID tag will be verified at the fair price shop for the authentication of the user. The user's identity will be verified by microcontroller which is connected to an Amazon Web Services (AWS) database. For added security One Time Password (OTP) is also sent to user's registered mobile number which needs to be entered in the system

This System is to reduce forgery from ration shops and users will get their grocery in very easy way. Also to reduce manual work, in this system we developed the smart ration card system based on the RFID and the BIOMETRICS, in which the user can fill their data in online mode. And also the manual working is not there. When user wants a ration, he/she comes with the Smart ration card, then the card is swipe and check whether the user is valid user or not. The fingerprints of that user also check and the allocated ration is distributed to that particular user, changes of adding and issuing of ration is done automatically in the government database.

III. Proposed System

The Smart ration card system uses Face Recognition. This system successfully eliminates the errors due to manual monitoring of ration data as all the data is automatically updated in the cloud based database. Also this system will enable the government to keep track of the consumers and their transactions. Although the system will reduce the security issues and malpractices present in the current PDS the starting cost of the system is high. To access the database and authentication of user requires internet connectivity which can be a problem in remote locations.

The advantages of this system are an efficient method for the consumer to buy the products in the ration shop and after the purchase is validated by the employee the consumer gets a text message mentioning the purchase details.

The system will works in two different parts. The first part is for capturing and creating a database by storing the image. And the second one is to compare the image with the stored images in the database. For feature extraction we used Haar cascade feature algorithm for recognition of the face. Camera module is pi camera interfacing to the raspberry pi module. It is used to capture images and send the clicked images to the raspberry pi module. Camera contains Light Emitting Dioses, LEDs and flashes to handle that light condition that is not explicitly supplied by the environment and these light conditions are known as ambient light conditions. Raspberry pi 3 module is a small computer board. When an image is taken by raspberry pi it is compared with database image. For the first time when we capture an image to Create a database raspberry pi module captured many images to create a database in the system and this database is compared with the live captured images.

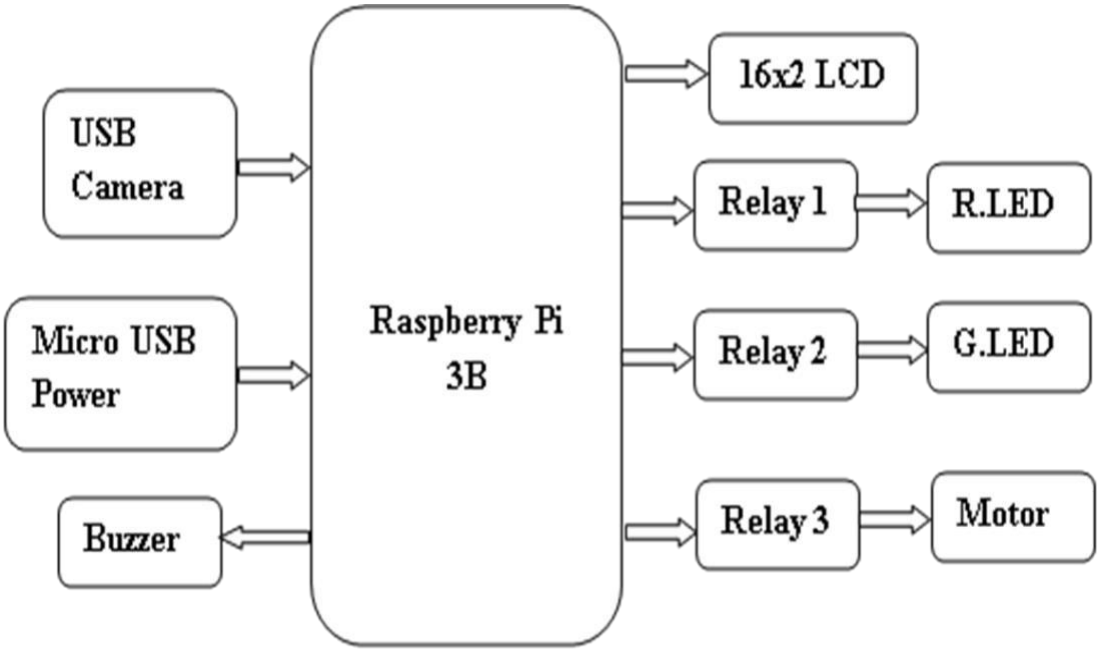

Fig.1: Block diagram of Smart rationing system by face detection

After comparing the two images, based on whether the output is positive or negative it gives commands to GSM module. Haar Cascade is basically a classifier which is used to detect the object for which it has been trained for, from the source. This proposed system uses Haar Cascades classifier as a face detection algorithm. Firstly, the algorithm needs a lot of positive images and negative images to train the Haar cascades classifier. Positive images are images with clear faces where negative images are those without any faces.

System architecture consists of train dataset with consumer faces. Consumer face is captured for testing. Captured consumer face is compared with the face stored in the dataset. If captured face match with the face stored in the dataset then system calculates the quantity of grains. After that it is distributed to consumer. This system will require very less human efforts for operation and is also very secure. By implementing this system government can keep track of all the delivered ration content very easily. In this system conventional quota card will be replaced by a Face Recognition system. This Faces will be verified with family members for authentication of the user. If user is found to be authentic then monthly quota of the ration available for the user is displayed. After successful transaction the database will be updated stating the ration content delivered to the user.

Input Unit

In input unit the Facial images for Face Recognition and Video frames for customer face detection are captured from the camera input devices respectively i.e. from Universal Serial Bus,USB Web camera.

Processing Unit:

The data which is collected from Input unit that is captured Image and Video frames input is fed into the processing unit in which the processing or calculations are performed on the proposed face detection of the ration card holder. Here the processing unit is nothing but a Raspberry Pi board, along with code scripts of the implemented modules. The systems consists of Raspberry Pi 3B and other interfacing devices like USB Camera, Micro USB power card, Buzzer, 16X2 LCD display and relays.

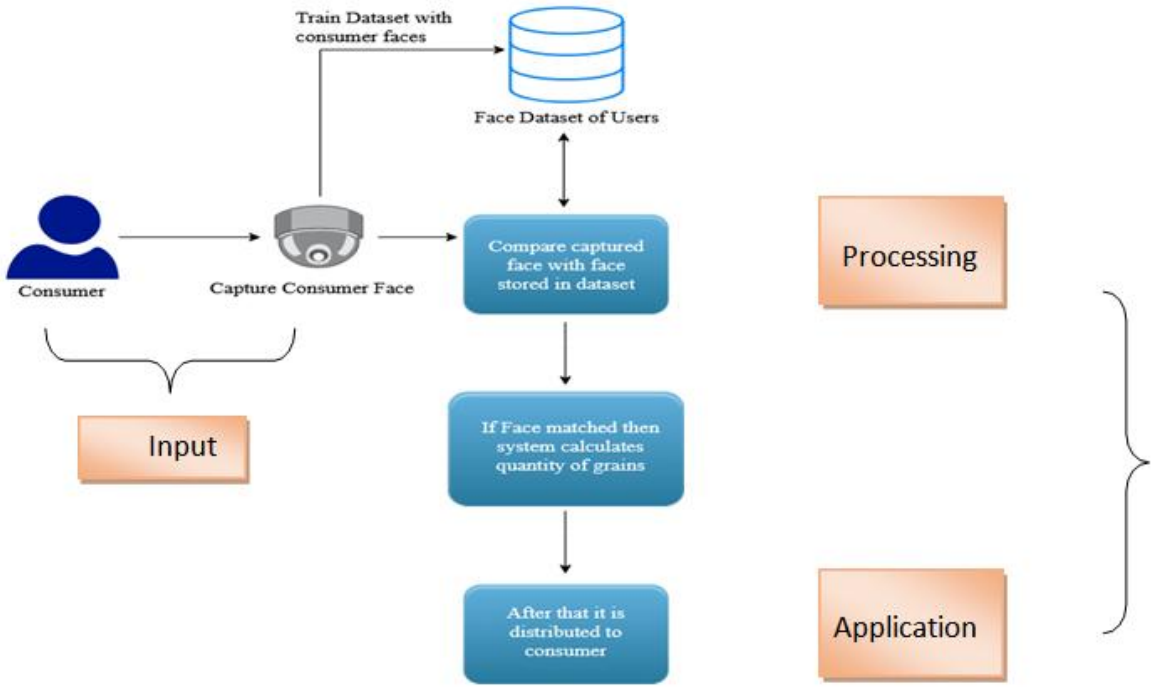

Fig 2: System Architecture

Communication Interface:

Communication interfaces which include wireless internet connectivity devices are associated with the face detection module used to access the food grains from ration store.

Application Specific Unit:

The Application specific unit which consists of driver circuitry, it is associated with DC motor and it starts functioning according to results of the module to perform opening or closing of dc motor for liquid items such as oil / kerosene.

IV. Results

The most important part of the project is the hardware implementation in accurate manner. The electronics components of the project are very easily understood and it includes connection of various hardware devices to the Rasperry Pi development board via General Purpose Input/Output, GPIO pins and various other available ports without need of soldering the wires for connection. The following Wiring diagram of Fig 3, shows how to connect and integration of the required hardware components of the proposed system like L293D driver IC, Dc motor, Raspberry Pi board, USB camera, Adapter, with Internet hotspot.

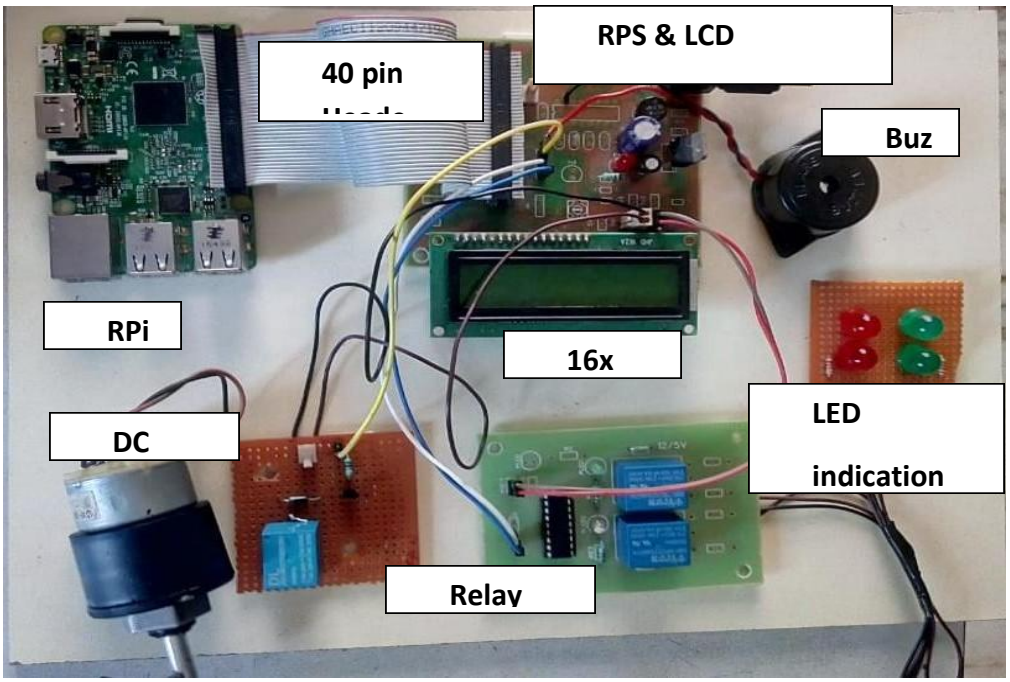

Fig.3: Schematic diagram of smart rationing system by face detection.

The pictures shows when the power of RPi is ON, connect RPi with remote desktop. To connect remotely, it requires ip address of Raspberry Pi. Use ip scanner such as advanced ip scanner and get the ip address of RPi connected to local wi-fi modem or hotspot.

Type remote desktop in laptop search and open the application. The application look like above picture and enter ip address of Raspberry Pi like 192.168.7.124.

Once the connection of remote desktop is established with Raspberry Pi, enter user name and password such as pi and raspberry respectively. Then linux operating system is ON and it look like in above picture.

Now open terminal window and enter into openCV virtual environment. To enter into virtual environment type the commands such as 'source .profile' and 'workon cv'

The linux now enabled the openCV virtual envirnonment. Now go to the path of program location by entering like 'cd Desktop/jvrao/Ration'. Now it is in the path of program locations. From here we can execute the program and run the proposed system.

Here we use two commands as nano / python filename. Nano command will open the program code and can edit / modify the program and save it. Type python command to run / execute the program file. In the above picture python face2.py and python face3.py program files are executed at different times.

Now execute the main program file 'ration.py' to operate the proposed system. When program executes LCD display the title and camera enabled.

Once the face is in-front of camera, the camera detects the face and try to identify the id of the face with HAARCASCADE algorithm. Once the face id is identified, the green LED get ON and issue the quoted ration grains and oil. The name of identified face will display on remote desktop as well as on LCD.

If the face id identified, the green LED will ON and after a delay of time motor will ON to dispense the oil from the barrels. If face is not identified (right side image), the LCD display unknown person and no ration is issued. Red LED will be on and Motor will be OFF

V. Discussion

The pictures shows when the power of Raspberry Pi is on, connect Raspberry Pi with remote desktop. To connect remotely, it requires ip address of RPi. Use ip scanner such as advanced ip scanner and get the ip address of Raspberry Pi connected to local wi-fi modem or hotspot. Type remote desktop in laptop search and open the application. The application looks like above picture and enter ip address of RPi like 192.168.7.124. Once the connection of remote desktop is established with Raspberry Pi, enter user name and password such as pi and raspberry respectively. Then linux operating system is ON and it look like in above picture. Now open terminal window and enter into openCV virtual environment. To enter into virtual environment type the commands such as 'source .profile' and 'workon cv'. The linux now enabled the openCV virtual envirnonment. Now go to the path of program location by entering like 'cd Desktop/jvrao/Ration'. Now it is in the path of program locations. From here we can execute the program and run the proposed application. The linux now enabled the openCV virtual envirnonment. Now go to the path of program location by entering like 'cd Desktop/jvrao/Ration'. Now it is in the path of program locations. From here we can execute the program and run the proposed system. Here we use two commands as nano / python filename. Nano command will open the program code and can edit / modify the program and save it. Type python command to run / execute the program file. In the above picture python face2.py and python face3.py program files are executed at different times. Now execute the main program file 'ration.py' to operate the proposed system. When program executes LCD display the title and camera enabled. Once the face is in-front of camera, the camera detects the face and try to identify the id of the face with HAARCASCADE algorithm. Once the face id is identified, the green LED get ON and issue the quoted ration grains and oil. The name of identified face will display on remote desktop as well as on LCD.

VI. Conclusion

The Smart ration card system uses Face Recognition algorithm. This system successfully eliminates the errors due to manual monitoring of ration data as all the data is automatically updated in the cloud based database. Also this system will enable the government to keep track of the consumers and their transactions. Although the system will reduce the security issues and misuse of ration in the current PDS the starting cost of the system is high. To access the database and authentication of user requires internet connectivity which can be a problem in remote locations.

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