Automated ration shop monitoring and controlling system based on embedded technology

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Abstract-Public Distribution System (PDS) introduces the Fair Price Shop (FPS) for distributing the grains to the poor peoples. In now a day's this PDS involves corruption and proscribed smuggling of goods. So this thesis suggest an approach to mechanize all the manual jobs in ration shop and the whole thing from data entry to weighing to thrashing is prepared by machines and the people have no hand in that. This provides high reliability and there brings a sense of straightforwardness to the consumers, hence no possibility of mistakes and practically no manual work. This scheme used to reduce the workers burden and easily maintain the stock details. Before going to the ration shop, first users show the stock availability details based on GSM message. Here the continuously monitoring the distributer of the ration shop. After distributing the materials the card holder receives the delivery Report from the ration shop the help of GSM.

*Keyword*s: **Raspberry-pi, RFID module, GSM technology, RFID smart card, Embedded Web Server.**

I.INTRODUCTION

Ration Card is one of the important documents for every Indian family. Every family is given facility by government to receive food grains against a card. But there is lot of corruption involved in TPDS such as black marketing of the subsidized food grains as many families do not claim their quota of food grains and many families claim the quota of other families. As a solution to above problems this paper proposes a system which is highly scalable Ration Distribution System based on embedded system. The main target of this project was to bring transparency between government and customer, and this transparency is provided by webpage. Here the conventional paper ration book is replaced with RFID based smart card. When any transaction is done by customer he/she will receive a message on his mobile through GSM technology.

The Traditional Public Distribution System (TPDS) was introduced in 1997 to benefit the poor and to keep the budgetary food subsidies under control to the desired extent. TPDS is aimed at reducing poverty through delivering minimum requirements of food grains at highly subsidized prices to the population below the poverty line. Public distribution system involves corruption and illegal smuggling of goods. The main reason of this to happen is that there is no specific technology involved in this system & the system is completely manually handled which causes lots of irregularities. In this project we have introduced a system based on RFID and GSM to avoid these drawbacks. Also the data which was stored registers or was handled manually will be now stored in MySQL database and so that any manipulation in data will not take place.

This system is completely automatized. When customer goes to ration shop he has to show RFID base smart card instead of ration book. Each customer will have a unique number of smart card. This card will be scanned by RFID module and is serially send to raspberry-pi. Raspberry-pi scans the data stored in MySQL database and if the unique number of that card matches with the data stored in MySQL then information of that customer will be displayed on GUI Screen and customer can perform his further process and if the number does not matches with data stored then invalid customer such message is received on GUI Screen. Whatever grains are allotted to customer is displayed on the screen and shopkeeper cannot change this data as he use to do when it was stored manually. Customer now has to give inputs using keyboard of whatever goods he/she has to buy. After all the transaction is finished then that message will be

received by customer on his mobile number, similarly same data will be updated on embedded web server which can be used by government servant and customer so that customer will have all the backup of his ration account and shopkeeper cannot lie to the customer. Also in previous system customer has to buy all the goods at same time but know in the introduced he can buy food grains required to him and keep the remaining food grains as it is and can buy them again when required.

RFID is used to identify objects using radio Communication. The most common usage is to identify objects in for example a supermarket. Still, bar code systems outperform RFID in this area because the cost of a bar code system is lower than that of an RFID system. The basic Components of RFID technology are the tags, readers and host computer. A tag is like a small memory module which can communicate with the reader and can be attached to objects one wants to track. The reader can search for a tag that is within range by sending out a predefined signal using Radio Frequency (RF). A tag that receives this signal responds back with its unique ID that has been preprogrammed in its memory. RFID reader reads information on the tag and passes it to the host computer for analysis. The RFID tag also can identify additional data such as temperature, humidity, etc. The reader is able to read and or wire data to tags using wireless network based system. RFID is a means of storing and retrieving data through electromagnetic transmission to a RF compatible integrated circuit. RFID tags operate in three frequency ranges: low frequency (LF, 30~500 KHz), high frequency (HF, 10~15 MHz), and ultra high frequency (UHF, 850~950 MHz, 2.4~2.5 GHz, 5.8 GHz). This article deals about the integration of RFID and WSN and discuss about the various methodologies to identify the physical factors that affecting the food on food safety centre. End of this article also discuss about the results and observations of physical factors that affecting the food.

Toward the concept of smart mall, the IOT technology embeds networks of sensors and actuators in buildings can effectively function in data collection and management so that it is anticipated to significantly improve the quality of shopping service. In order to achieve this, this paper proposes a reliable and cost effective smart shopping cart (SSC) with a smart user-interactive interfacing scheme. The SSC aims to reduce the man power and promote the shopping experience for its customers, and thus it is suitable for use and integrated into the IoT network of the smart mall. In the following, the implementation of the SSC will be described in detail with the aid of vision and wireless technology to provide the robustness and ease of use from the point of view of the customer. Finally, the experiments in a standard mall will be conducted to present the encouraging results in real world deployment. The Radio Frequency Identification (RFID) system is combination of a tag and reader. The RFID tag provides a cost effective solution to identify the object. The object may be any living and non living. The RFID system is used many applications such as healthcare, sales supply chain, luggage identification and security enabled keys, etc. These applications were discussed in various research papers, but till now, no one introduced the food safety centre enabled RFID system. That is the physical factors affecting the food to get into contaminated need to be identified and remedy need to be taken for the same. This RFID system needs to be integrated with the Wireless Sensor Network (WSN) Enabled Architecture. So this system is called as RFID Sensor. This research paper also presents three various methodologies to identify the physical affect that affecting the food. At the end of this paper, discuss about how the RFID Sensor is going to be introduce in the Food Safety Centre in Indian Ration Shops.

II. CONVERSION FROM OLD RATION SYSTEM TO SMART RATION SYSTEM

Fig. 1 Ration book to Smart Card

The conventional ration card which was in the form of book is now in the form of RFID based smart card and each customer will have his unique number of card which will be scanned by RFID receiver when he goes to ration shop. In previous system all the customer data was stored in registers and which was completely manually handled is now stored in MySQL database in which manipulation of data by shopkeeper cannot be done. In this database customer name, mobile number, UID number, smart card number, grains allotted to them is stored and this database is completely handled by the government, shopkeeper cannot manipulate this data. RFID module is used to scan the smart card and GSM is used to send message on customer mobile number. Monitor is connected to board using HDMI cable which is used to display GUI screen.

Fig. 2 GUI Screen

When card is scanned and if the number of card is matched with the database the GUI screen shown in above fig. will be displayed on monitor.
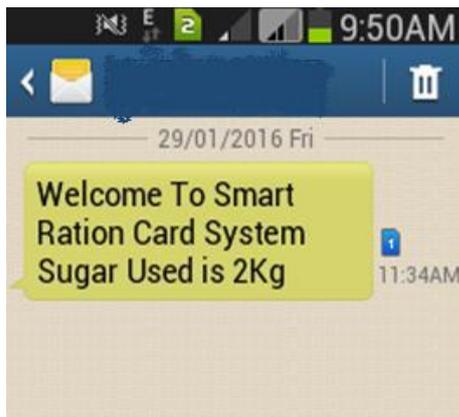

Fig. 3 Message received on mobile

When all transaction is finished customer will receive a message on mobile as shown in above fig. so that he has backup of his ration account.

III.AUTOMATIC BILLING FOR SMART SHOPPING CARD

The smart shopping systems usually require other auxiliary wireless communication systems (especially low-cost) to perform indoor positioning and product information broadcasting. Thus, the dual-antenna RFID reader is adopted in the developed SSC to identify the items in the cart (internal antenna) and out of the cart (external antenna). The directional antennas are employed and the output power from each antenna is optimized to reduce the detection errors and interference between them. The output power levels are 27dBm and 10dBm from the external antenna and the internal antenna, respectively, resulting in a communication distance of about 4m and 30cm. In addition, the external antenna is also used for indoor positioning, identifying the location in aid of suggesting the shopping routines. The detected item IDs are linked to the database of the merchants, and each the product information is displayed on the user interface of the SSC. The total amount of purchasing can be automated calculated and then send to the billing system of mall.

The proposed smart shopping cart (SSC) is presented. The current development of the system with add-on facilities is shown in Fig. 1. The SSC combines modularity, simplicity, and ease of use at a low cost development so that it can be potentially targeted to assist customers in doing shopping and integrated into the IoT network of smart mall. The SSC is based on a standard shopping platform refitted with the powered motor and several accessorial devices like a laser scanner (URG-04LX-UG01) and an RFID tag reader (EV-NV-00) with which the additional information of the products in the cart can be provided on the user interface. The control unit of the SSC adopts an embedded computer (UNO-1483G) for the motion control of power motors. This selection is motivated since the embedded computer is reasonably priced, highly expandable, and real-time performance, and it is flexible to be coordinated with a tablet computer, driver circuits, RFID tag reader, and so on. The embedded computer utilizes a 24V 9 AH Li-ion battery pack.

IV. RELATED WORK

RFID is used to identify objects using radio Communication. The most common usage is to identify objects in for example a supermarket. Still, bar code systems outperform RFID in this area because the cost of a bar code system is lower than that of an RFID system. The basic components of RFID technology are the tags, readers and host computer. A tag is like a small memory module which can communicate with the reader and can be attached to objects one wants to track. The reader can search for a tag that is within range by sending out a predefined signal using Radio Frequency (RF). A tag that receives this signal responds back with its unique ID that has been preprogrammed in its memory. RFID reader reads information on the tag and passes it to the host computer for analysis. The RFID tag also can identify additional data such as temperature, humidity, etc.

Radio Frequency Identification (RFID) and Wireless Sensor Network (WSN) are two important wireless technologies that have wide variety of applications and provide limitless future potentials. However, RFID and sensor networks almost are under development in parallel way. Integration of RFID and wireless sensor networks attracts little attention from research community. In 2012 alone, 1.02 billion RFID tags were sold. The lower frequency tags are less affected by the presence of fluids or metals compared to the higher frequency tags. They are fast enough for most applications, and are also cheaper than any of the higher frequency tags. However, low frequency tags have shorter reading ranges. The most common frequencies used for lower frequency tags are 125 ~

134.2 KHz or 140 ~ 148.5 KHz. The passive tag does not use any battery to boost the energy of the reflected signal. Similar to passive tags, semi-passive tags use the radio waves of senders as an energy source for their Transmissions. On the other hand, sensor networks have been the focus of great research activity but they have been around mainly as a proof of concept with the main exception of their adoption in military applications. The design of a Sensor Embedded Radio Frequency Identification (SE-RFID) System based on active RFID tags.

V. INTEGRATION OF RFID AND WIRELESS SENSOR NETWORK

The Integration of RFID and WSN provides the better monitoring of objects. RFID relates to the technique of transmitting the identification of an object in the form of a unique serial number using radio waves. WSN and RFID are complementary because they were originally designed with different objective, that is RFID for identification while WSN for sensing. RFID systems are able to accurately identify objects, but often sometimes provide unreliable information concerning the location of an object. Sensors on the other hand, present many advantages in recognizing the location of an object but they are unable to identify it. The efficient integration of RFID and WSNs offers great advantages in accurate location tracking. For these reasons integrations of WSN and RFID provides a significant improvement on monitoring. Wireless sensor network has applications in environment, disaster prevention, healthcare, home automation, intelligent transportation, precision agriculture, etc. The sensors are used to collect and transmit information about their surrounding environment. The node collects the information from a group of sensors and facilitates communication with a control center. RFID software helps in collection and processing the data. The software helps the system in collecting and processing of large volumes of data. The system consists of three classes of devices.

We combine Smartphone, smart glass, voice control technique, as well as wireless communication technology to develop a system for unobtrusive real-time shopping assistance in retail stores. It consists of four components, namely, Controller, Processor, Communicator and User Interface. The Controller component controls the cameras' on/off of the smart glasses, the Processor component processes the scanning procedure, the Communicator component controls the transmission of information between smart phones and smart glasses, and the User Interface component shows the results to users. When the system is initiated, the camera of smart glass is switched on through user's voice command or the launching command from smart phones, and then the glass is able to scan the QR code or the bar code within the range of camera, and obtain information including price, name, function, purpose, usage, and precautions from Internet. After sorting out these information, for example price from low to high, the user can easily check details of interested goods from the screen of smart glasses. The Controller component runs on the smart phone with a number of sensors. We propose an energy-efficient control algorithm based on accelerometer and gyroscope to adaptively open and close the camera sensor on the glass in order to address the issue of limited energy source on smart glasses. We utilize the accelerometer and gyroscope to judge where a user might walk purposefully to a section of interest, dwell there for a while and plan to examine specific commodity more closely in retail stores. When the Controller component detect that a user might go to a section and stay there for a moment, it sends commands to the glass to launch the camera of the glass with the help of the Communicator component.

VI. LCD AND KEYPAD INTERFACING

LCD is electronic visual display that uses the light modulating properties of liquid crystal. System uses 16x2 LCD modules which is easily programmable and economical. Interfacing of 16x2 LCD modules with LPC2148 which operates on +3.3V is not same as interfacing with microcontrollers like AVR which operates on +5V. A smart card is a combination of electronic modules embedded in a plastic card to perform simple access applications to more complex applications, like monetary computation and identity status. The core function of a smart card is to store and process data based on the application it is programmed. The Indian smart card industry is characterized by popular applications like SIM cards, access cards, vehicle registration, tolling, ticketing, loyalty cards, pay TV cards, financial and health cards. These cards are contact based or contactless, which can be either upgraded or can function as use and throw cards. RFID, a relatively new technology, is gaining popularity in some areas. RFID tags are used for product tracking and identification application. Some of the popular applications include vehicle tracking, retail goods tracking, LGP cylinder tracking, library management, auto component tracking.

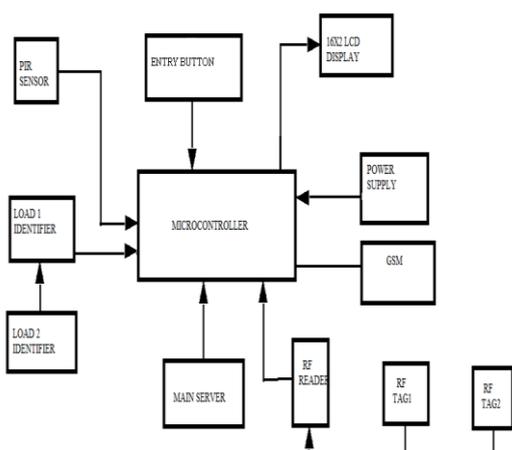## VII. PROPOSED SYSTEM HARDWARE

Fig. 4 Block Diagram of Smart ration shop
Monitoring System

In conventional system, Indian government has implemented a UID (Unique Identification) number system called AADHAR number, which contains all general information like age, count of family, finger print of the family, address, contact Numbers, bank account information etc. for every resident in the country. Using the AADHAR number and contact details, the government can send a message (SMS) to the individuals, containing information regarding quantity of products allotted to a public in a respective ration shop. Once when the consumer insert the smart card in the smart card inserter, the smart card can be accessed by entering the password, which was given to the all consumers separately. But there is a chance of miss using the smartcard password. To overcome the miss usage, the proposed system includes the finger print detector which detects the finger print of the consumer and their family members.

The main components used in the power supply unit are Transformer, Rectifier, Filter and Regulator. The 230V AC supply is converted into 9V AC supply through the transformer. The output of the transformer has the same frequency as in the input AC power. This AC power is converted into DC power through diodes. Here the bridge diode is used to convert AC supply to the DC power supply. It has an ripple content and for normal operation for this circuit. Ripple content of the power supply will reduce the life of the circuit. So to reduce the ripple content of the DC power supply, the large value of capacitance filter is used. This filtered output will not be the regulated voltage. For this purpose IC7805 regulator IC is used in the circuit.PIC 16F877A microcontroller is used. Load sensor also commonly known as load transducer or load cell. Strain gauge load cells are commonly used. It is defined as an transducer that converts a load or force acting on it into an electrical output

signal. This electrical signal can be a voltage change, current change or frequency change depending on the type of load cell.

GSM uses a variation of time division multiple access (TDMA).It operates at either the 900MHz or 1800MHz frequency band. One of the key features GSM is the Subscriber Identity Module. The SIM is a detachable smart card containing the user's subscription information and phone book.PIR sensor allow you to sense motion, almost always used to detect wheather a human has moved in or out of the sensors range. They are small, inexpensive, low power, easy to use and don't wear out. They are often referred to as PIR, Passive Infrared, and Pyroelectric or IR motion sensors. The conventional ration card which was in the form of book is now in the form of RFID based smart card and each customer will have his unique number of card which will be scanned by RFID receiver when he goes to ration shop.

VIII. CONCLUSION AND FUTURE WORK

There are few drawbacks in the existing system, first one is that all the data is handled manually and there is no specific technology involved in the system, secondly if the materials are not bought at the end of month, then they will sell to others without any intimation to customers and government. To overcome this problem the proposed system creates the transparency in public distribution system as the work becomes automatic. With the help of this system, it is possible to make public distribution system efficient and free from malpractices. After transaction the controller will send the information to the customer & this same information will be updated on web page. By using this system we can avoid corruption in ration/public distribution system to some extent.

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