Efficient Usage of Resources through RFID Cards

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Abstract

Background/Objectives: Now-a-day's petrol consumption has increased too much. The idea of limiting the resources by using them effectively is our main objective. **Methods/Statistical Analysis:** Trending identification techniques like RFD Technology is used here for implementing the proposed approach. Each person having a vehicle is provided with these cards containing unique ids. The unique id is recognized by the RFID Reader. As per the vehicle requirement the usage value is predefined. When the person uses his petrol, the value will be decremented automatically in the database. LCD is used to display at present usage value of the customer and also the remaining usage value. **Findings:** Consumers may face difficulties after the usage limit is exceeded so he/she should take care of their usage of the petrol. Quicker responses are needed from the database. **Application/Improvements:** This type of technique can be applied on several non-renewable energy sources. By using high end servers like we can improve its speed and processing efficiently.

Keywords: Databases, PC, RFID Card, RFID Reader, RS-232, UL Kits

1. Introduction

Utilizing resources is not only the human's first priority but also conserving them is his responsibility. In this paper we would like to suggest an RFID Technology based approach to limit the non-renewable resources such as petrol. Petroleum Geologists believe that the time when one-half of Earth's petrol has been exploited may occur between 2020 to 2050 although a variety of experts believe it has occurred already. Considering future generation's exploitation of resources should be done properly, if not we have to face dangerous situations. Efficient usage of these kinds of resources is the only solution to this problem. RFIDTechnology had become an emerging technology of its capacity to carry large amounts of data, reusability, processing efficiently and its high levels of security, medicines and eating products[1]. Usage can be limited by using RFID Cards.

2. RFID Technology

Recent days RFID Technology has become so convenient for usage and cost effective. It uses radio waves as a medium to transfer data from RFID card to the RFID Reader[2]. RFID Reader takes the responsibility of received data for transmitting to the desired destination. Card and Reader will operate at same frequencies for receiving and transmitting operations[3]. This technology is a wireless mode of communication and has a range of several meters. RFID System used in several areas such as restricting unauthorized access control which provides security, tracking location or a resource. RFID Technology has more advantages compared with barcode system so its implementation had a full demand in present generation.

3. Methodology

3.1 Composition of System Architecture

From the Figure 1, this system architecture includes mainly RFID System, UL kit, PC and Database. RFID System includes RFID Card, RS-232, RFID Reader and antenna. RFID System is attached to the UL kit. UL kit is attached to PC via RS 232. PC helps to interact with the databases. Databases hold a key role by maintaining all the required information.

3.2 Working of System Architecture

This architecture is designed to achieve the usage of resources efficiently. RFID System helps to read the data from tags. The data will be transmitted to the reader, which is in read mode. All the data received from the reader will be transferred serially to the PC via RS -232[4]. PC receives the data and requests the database for all the information regarding that number. Information retrieved from the database is displayed on the LCD present on UL kit. So the person at filling station will know the usage and he decides whether to fill petrol or not which achieves efficient usage of resources.
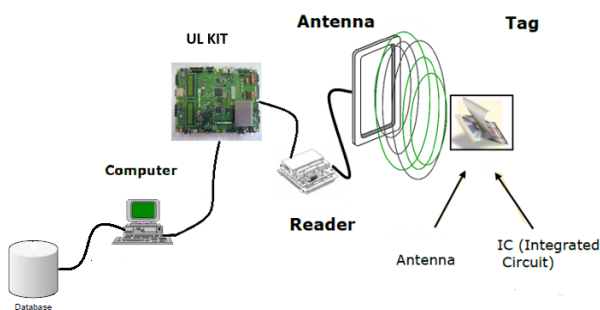
3.3 Block Diagram

Figure 1. Process diagram for proposed system.

4. Design of RFID System

In RFID System key components includes a tag, reader, antenna, RS 232, UL kit, as shown in the Figure 2. The main purpose of this system is to read the number present in the RFID Card and pass it on for further processing.
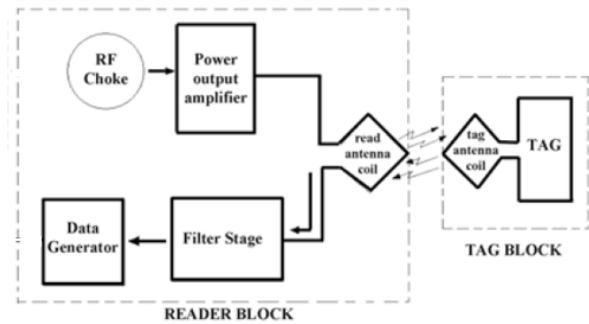

Figure 2. Basic architecture of RFID System.

The electronic tag holds the data in the form of a number used to recognize the person automatically with the help of a database. This tag technology is an automatic identification with the help of RF signals. This system offers high frequency ranges from 125 KHz to 2.4 GHz[5]. RFID Reader helps to track the data present in the tag. When the person places the tag near the reader, the reader antenna will send a command to the tag for retrieving the information. When the tag receives a command then it execute and transmit the data to the reader. Inbuilt antenna present inside the tag will helps to transfer the data from tag to reader[6].

Reader is connected to the UL kit. This kit helps to display the person's unique number in the Character LCD along with his name. Also the person's photo is displayed in the graphic LCD. The communication between the reader and UL kit id is done with the help of RS 232 protocol. It is one mode of serial communication helps to transmission of the data between the devices serially. RS 232 works with a baud rate of 9600 bits per second. RS 232 is used widely because of its ease of use. The data from the UL kit is transferred to the computer for further processing.

5. Design of Database

An efficient and robust database is maintained for processing of RFID data. Initially all the requirements for this system as shown in the Figure 3 is gathered such as RFID card numbers, name of the person using the card, his residential address, average monthly consumption in liters, vehicle type, usage value till date in liters. A table is created in such a way holding all the above details for processing. The data i.e. card number from the reader is
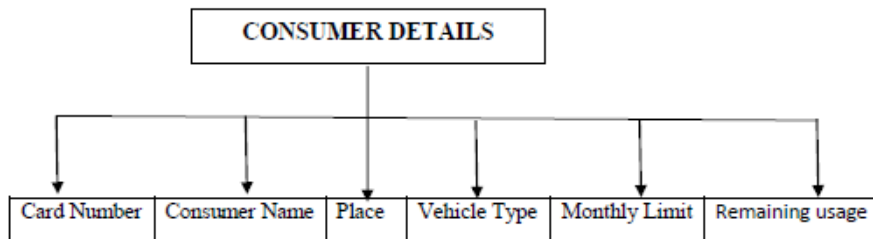
Figure 3. Entities and attributes used in the database.

queried and sent to the backend database[7]. The database purpose is to retrieve the data, based on the card number and supply them to the PC.

The PC will further display the details of the customer on the UL kit. The data modified at the filling station is updated in the database for future references. The employee at filling station should be careful while updating the value for avoiding errors.

6. System Operation

At the time of purchasing vehicle, the owner is provided with RFID cards. These cards contain unique identification numbers stored in it. It is used to recognize who the owner is and what type of vehicle he is using. Based on the vehicle type, its monthly petrol consumption is calculated and stored in our database as a default value. For sure the vehicle needs to be filled with the petrol for transportation. At the filling station in order to get petrol the owner needs to show the RFID card. At each and every filling station, we have RFID Readers. They will read the unique number in the RFID card and the data is transmitted serially to the UL kit by using RS 232 protocol followed by PC[8]. PC requests the database to find the vehicle usage value. The value retrieved from the database i.e. usage value and the user name is displayed on the UL kits, as shown in the Figures 4 and 5. If the usage value is within the range the vehicle is allowed to fill the petrol and its value is decremented and updated in our database. If the remaining usage value in our database reaches to zero, he is not allowed to fill the petrol and needs to wait till the next month for renewal. The remaining usage value is automatically updated in the database at the first day of every month. By following this approach the owner will not simply use the vehicles for smaller distances instead he may go by walk. Petrol consumption is limited so that we can use it for longer time period.

7. Results:

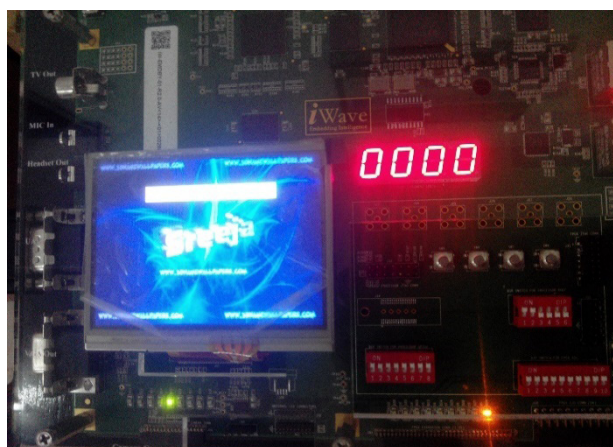**Figure 4.** Consumer name displayed in UL Kit.

Figure 5. Remaining usage value in LED's.

8. Conclusion

In this paper, we are proposing an RFID Technology based integrated approach for limiting the resources like petrol. RFID Technology becoming flexible and

cheaper now-a-days helps to develop an efficient design. Considering real time possibilities an embedded device is included in this design i.e. UL Kit. RFID tag with the help of database we can track the persons details. Verifying the user's identity and his remaining usage value the person is authenticated for filling the petrol. Web server helps to centralize the entire system for global access. Usage of these systems helps a lot in conserving the petroleum resources and preventing its depletion.

9. References

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